

# Missouri GapAnalysis

June 2011



Missouri  
Department of  
Natural Resources

Prepared by the Building Codes Assistance  
Project for the Missouri Department of  
Natural Resources





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## ACRONYMS AND ABBREVIATIONS

APELSLA- Missouri Board for Architects, Professional Engineers, Professional Land Surveyors and Landscape Architects

ARRA/Recovery Act – American Recovery and Reinvestment Act of 2009

ASHRAE – American Society of Heating, Refrigerating, and Air-Conditioning Engineers

BCAP – Building Codes Assistance Project

BPI – Building Performance Institute

CEUs – Continuing education units

DOE – U.S. Department of Energy

DNR – Missouri Department of Natural Resources

EEBA – Energy & Environmental Building Alliance

EECBG – Energy Efficiency and Conservation Block Grants

EIA – U.S. Energy Information Administration

EIERA - Environmental Improvement and Energy Resources Authority

EEPS – Energy Efficiency Portfolio Standard

EPA – U.S. Environmental Protection Agency

EPC – Energy Performance Contracting

HBA – Home Builders Association

HERS – Home Energy Rating System

IBC – International Building Code

ICC – International Code Council

IECC – International Energy Conservation Code

IRC – International Residential Code

KCP&L - Kansas City Power & Light

LEED – Leadership in Energy and Environmental Design

LIHEAP – The Low Income Home Energy Assistance Program



MABOI - Missouri Association of Building Officials and Inspectors

MAC - Missouri Association of Counties

MACA - Missouri Association of Code Administrators

MACE - Missouri Association of Code Enforcement

MEC – Model Energy Code

MEEA – Midwest Energy Efficiency Alliance

MMC – Metropolitan Mayors Caucus

NAAB - National Architectural Accrediting Board

NAHB – National Association of Home Builders

OA – Missouri Office of Administration

OCEAN – Online Code Environment and Advocacy Network

PBF - Public Benefit Fund

PDH – Professional Development Hours

PSC - Public Service Commission

PNNL – Pacific Northwest National Laboratory

RECA – Responsible Energy Codes Alliance

RESNET – Residential Energy Services Network

RPS – Renewable Portfolio Standard

SEP – State Energy Program

USGBC – U.S. Green Building Council



## EXECUTIVE SUMMARY

The purpose of the Missouri Gap Analysis Report is twofold: 1) to document and analyze the unique strengths and weaknesses of the state's existing energy code adoption and implementation infrastructure and policies; and 2) to recommend actions that state agencies, local jurisdictions, and other stakeholders can take to support and encourage local jurisdictions to adopt, enforce, and improve compliance with model energy codes. The report also details some of the state's current best practices and offers Missouri-specific recommendations for actions that would improve the energy efficiency of Missouri's built environment.

During research for this report, BCAP conducted in-depth interviews with numerous state government officials, home builders, code enforcement professionals, and municipal and county representatives. Particularly useful references come from code enforcement personnel in Kansas City, Grandview, Independence, Columbia, St. Louis, Creve Coeur, Kirkwood, Excelsior Springs, Kirksville, Poplar Bluff, West Plains, Cape Girardeau, Springfield, and St. Charles.

The *Introduction* section provides an overview of the amount of energy residential and commercial buildings consume, the amount of money Missouri spends on imported energy, and a broad perspective on the status and importance of energy code adoption, enforcement, and compliance.

The *National Perspective on Energy Codes* section provides a comparison of Missouri's energy code adoption status to other states in the United States. It describes the role of the U.S. Department of Energy in the policy process and provides information on federal funding provided to Missouri through the American Recovery and Reinvestment Act of 2009 (ARRA).

The *State Overview* section provides an overview of Missouri's important demographic and economic indicators: population growth; permitting trends in multiple cities and counties; energy consumption and production; the inclusion of energy codes as part of city and county climate plans; and a list of key stakeholders.

The *Missouri's Energy Code* section outlines the process of energy code adoption and other building codes in the state. It discusses Missouri's unique system for authorizing local jurisdictions to adopt codes, offering key political insights gleaned from numerous interviews with state and local officials and code enforcement personnel. This section also describes the potential energy and financial savings available to owners and occupants of new buildings if the state were to achieve substantial compliance with the national model energy codes. Finally, it includes legislation and rules that impact this policy arena in Missouri.

The *Implementation* section details the programs and initiatives offered by the state government in order to support and incentivize local jurisdictions to increase building energy efficiency.

The *Compliance* section explores regional differences in how stakeholders perceive energy, the requirements for licensure and continuing education for building construction trades; and how third-party inspectors can assist in strengthening the energy efficiency market.

The *Enforcement* section describes how enforcement is conducted by local building departments, common code-related challenges, and areas for improvement. It includes the requirements of enforcement professionals as related to the energy code, including continuing education units.



The *Best Practices* section highlights actions that leading cities and counties in Missouri are taking to improve the energy efficiency of city-owned and managed buildings, often via green building initiatives launched at the local level.

The *Recommendations for Improvement* section prescribes 13 actions that could be taken to support, assist, and encourage local jurisdictions with the adoption and enforcement of modern energy codes. Recommendations include training, promotion, consumer education, and other activities designed to encourage updated policies and greater code compliance rates.

Finally, the report's *Conclusion* summarizes the key findings, including the needs and opportunities to achieve improved adoption, compliance, and enforcement in local jurisdictions as well as importance and benefits of energy codes to the state of Missouri. In order to move Missouri forward in modernizing minimum building standards, the greatest areas of need are education and funding. A statewide sampling of stakeholders reflects the following general opinions toward energy codes:

- Many builders don't believe that energy codes should be mandated nor do they report that consumers demand higher efficiency buildings;
- Many buyers assume that new buildings are energy efficient and don't understand the first cost and long-term costs of ownership, and often don't have the opportunity to ask builders for more;
- Code officials often lack the tools and knowledge needed to advocate for more stringent energy codes;
- Policy-makers often do not have the resources and information they need to understand the value that minimum energy codes bring to the economy, their citizen constituents, and the state.

Appendix A offers a list of DOE and Pacific Northwest National Laboratory (PNNL) energy code resources.



## INTRODUCTION

A large amount of energy is used to power and maintain buildings. Buildings account for 40 percent of total energy use and 72 percent of electricity use in the United States,<sup>1</sup> and are also responsible for 40 percent of U.S. greenhouse gas emissions.

Missouri spends more than \$20 billion annually on energy, importing nearly 95 percent of primary energy resources.<sup>2</sup> Importing so much energy from out of state requires exporting dollars that could instead remain in-state to support Missouri's economy. Energy efficiency measures help retain dollars in-state, strengthening local economies and improving the living standards of Missouri families. By reducing the energy demand in buildings and providing a range of social benefits (listed below), energy codes can be effective instruments in a state's policy toolbox:

- Decrease peak energy demand, mitigating the construction of expensive new power plants;
- Reduce greenhouse gas emissions and air and water pollution;
- Increase the reliability of our infrastructure, as lowered demand reduces stress on an aging energy grid system; and
- Improve indoor air quality.

Some claim that energy codes will result in higher upfront building costs or that an energy-efficient building or home is too costly. However, there are two costs that should always be considered when purchasing a building: (1) the upfront (first) cost; and (2) the long-term (operational) cost over the life of the building. Design and construction costs for buildings account for just five to ten percent of the total occupant spending over the span of a building's serviceable lifetime. Operations and maintenance costs account for 60 to 80 percent of the total lifecycle costs.<sup>3</sup>

Buildings also last a long time. Today's building energy policies will affect energy consumption through the year 2060 and beyond. There were about 113 million households in the United States in 2006 and by 2030, there are estimated to be 141 million households.<sup>4</sup>

Recent improvements in the stringency of the model energy codes – and the development of the first green building codes – continue to raise the bar for energy-efficient design and construction to levels that were almost unimaginable a few years ago. Retail and office buildings constructed to meet the requirements of the International Energy Conservation Code (IECC) can be over 30 percent more energy efficient than those not constructed to meet national model energy standards.

The Recovery Act (also known as the American Recovery and Reinvestment Act of 2008) has provided states and cities with unprecedented funding and incentives to adopt the model energy codes, and more places are taking advantage of these opportunities than ever before. This favorable environment for more stringent codes is part of a larger transformation in the way advocates, policymakers, industry and utility representatives, and the general public view energy efficiency. Today, energy codes are increasingly perceived as a viable and cost-effective component of a comprehensive solution to our current economic, environmental, and energy concerns.



Yet, for all this recent progress and promise, energy codes nationwide remain underutilized. In municipalities across the country, energy code enforcement and compliance remain woefully insufficient. While codes development and adoption are the necessary first steps of the energy codes process, they alone do not guarantee compliance. To ensure that energy codes accomplish their potential to reduce energy use and save money, states and cities must design and carry out effective and realistic energy code implementation strategies.

## NATIONAL PERSPECTIVE ON ENERGY CODES

The International Energy Conservation Code (IECC) and ASHRAE Standard 90.1 are developed and published every three years by consensus-based non-governmental organizations – the International Code Council (ICC) and the American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE), respectively. While there is no federally mandated minimum standard for energy efficiency in private residential or commercial buildings, there are national model codes (ASHRAE 90.1-2007 and 2009 IECC) that establish baselines for residential and commercial development. States that want to ensure that construction within their boundaries meets national minimum standards will adopt the national model codes. The responsibility for adopting energy codes is generally left to state governments (though in some cases, like Missouri, this authority is passed down to local governments). From a national perspective:

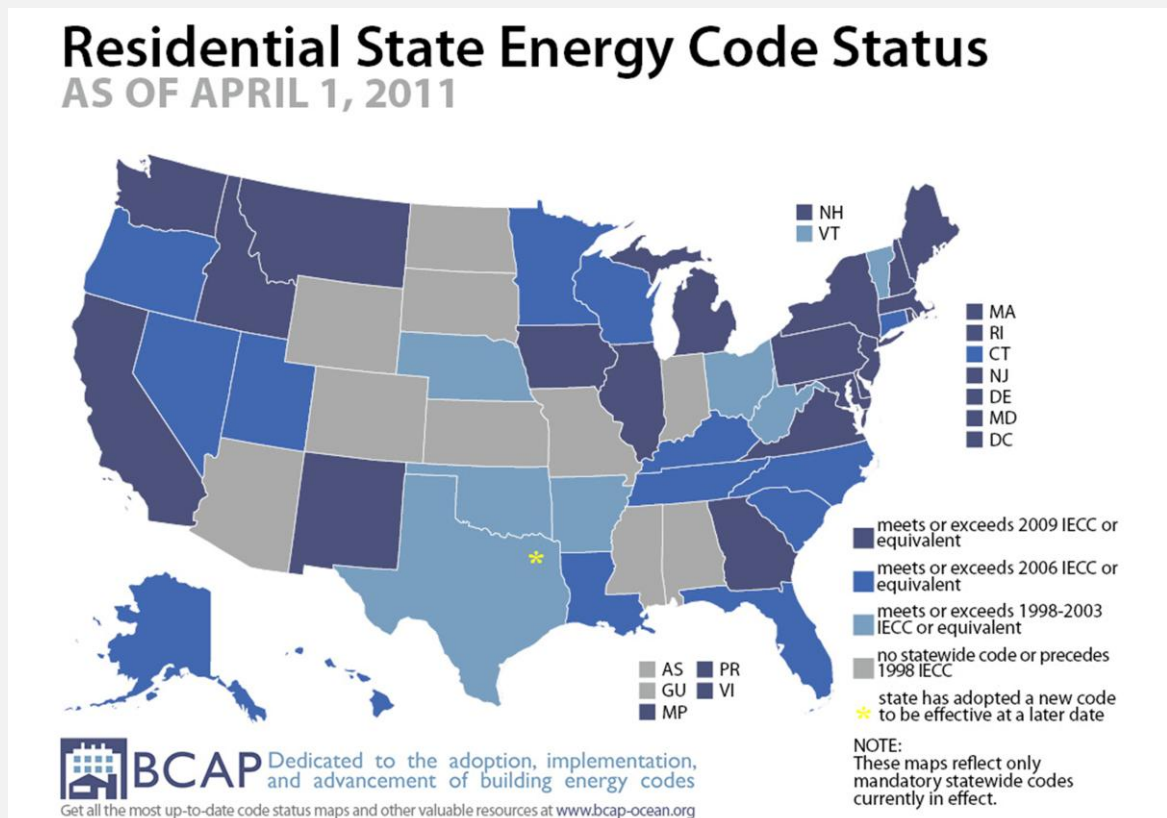
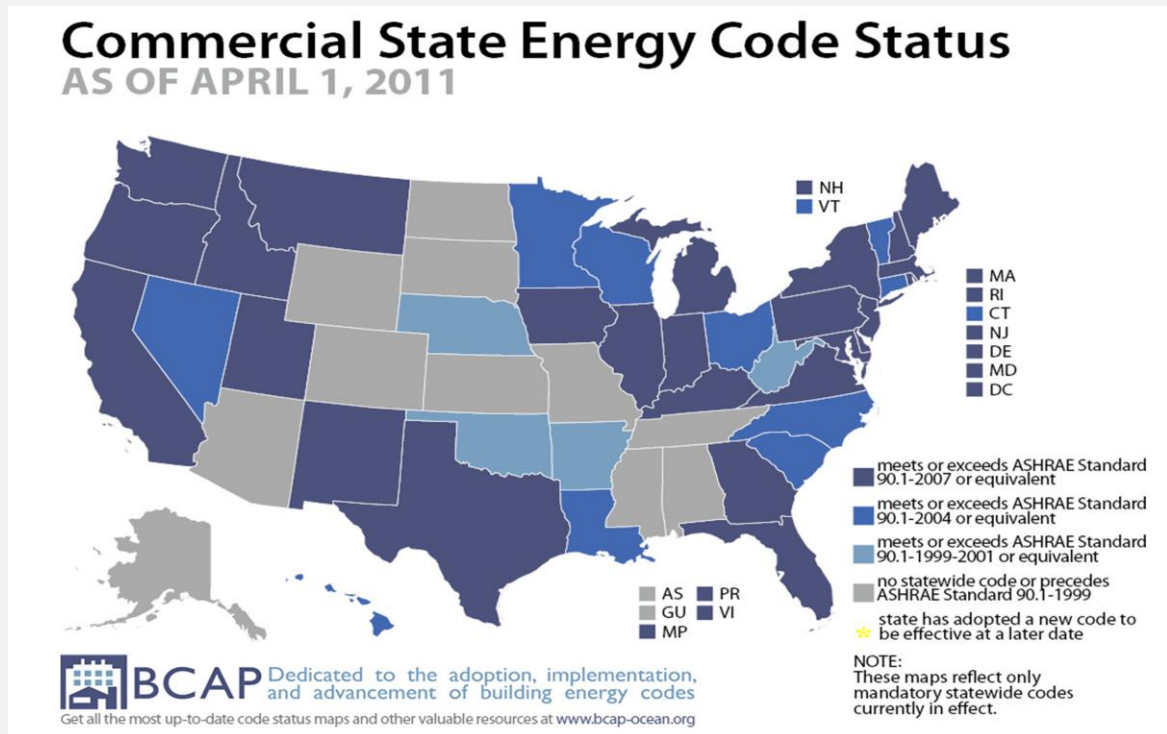
- **Commercial Energy Codes:** As of April 1, 2011, 25 states, three U.S. territories, and the District of Columbia have mandatory statewide commercial energy codes in effect that meet or exceed the efficiency of ASHRAE Standard 90.1-2007.
- **Residential Energy Codes:** Nineteen states, three U.S. territories, the District of Columbia have residential codes that meet or exceed the efficiency of the 2009 IECC. Several other states are in the process of updating their codes. (See Figure 1).

From the perspective of some of Missouri's neighboring states:

- Iowa and Illinois both adopted the 2009 IECC in 2010, with Illinois adding an automatic triennial code review cycle -- similar to the one Iowa has had in place for the past decade.
- Nebraska and Oklahoma are in the process of adopting the latest model codes for 2011 and 2012, respectively.
- Kansas and Arkansas are struggling to implement statewide standards, although the Arkansas General Assembly recently granted the state energy office the authority to update the state energy code.<sup>5</sup>



Figure 1 – U.S. Energy Code Status Maps





## FEDERAL POLICY

Although energy code adoption occurs on the state and local levels, the federal government—through Congress and the U.S. Department of Energy (DOE)—has played a significant role in advancing energy code development, determining the relative energy savings of national model energy codes and supporting state- and local-level adoption and implementation.

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### EPACT

The Energy Policy Act (EPAct) of 1992 requires DOE to determine whether the most current model energy codes would improve energy efficiency for new and renovated residential and commercial buildings. EPAct also mandated that DOE make a new determination within twelve months for every subsequent revision of these codes. Each state would then have two years to certify that it had revised its own energy code to meet or exceed the requirements of the latest edition of the national models. A state could decline to adopt a residential energy code by submitting a statement to the Secretary of Energy detailing its reasons for doing so.<sup>6</sup>

For commercial buildings, DOE determined in late 2008 that ASHRAE Standard 90.1-2004 would achieve energy savings of 13.9 percent above the previous Standard 90.1-1999 for national source energy demand and 11.9 percent above for building energy consumption.<sup>7</sup>

For low-rise residential buildings, EPAct currently references the 2000 IECC.<sup>8</sup> DOE, however, has preliminarily determined that the 2009 IECC would achieve greater energy efficiency than the 2006 IECC. Also, DOE has issued a preliminary determination that the 2006 IECC would achieve greater energy efficiency than the 2003 IECC. Finally, although DOE has preliminarily determined that the 2003 IECC would not achieve substantially greater energy efficiency than the 2000 IECC, DOE found that the 2003 IECC is no less energy efficient than the 2000 edition. When that determination is finalized (expected sometime in 2011), the 2009 IECC will become the baseline residential code for EPAct compliance.<sup>9</sup>

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### THE RECOVERY ACT

In February 2009, the American Recovery and Reinvestment Act (ARRA)—federal legislation appropriating funds for a variety of state economic initiatives—allocated \$3.1 billion for the DOE State Energy Program (SEP) to assist states with building energy efficiency efforts.<sup>10</sup> As a condition of accepting \$57.4 million in SEP funding, Gov. Jay Nixon certified to DOE that Missouri “is committed to working with communities” to “create model energy efficiency standards that local units of government could adopt.”<sup>11</sup> As outlined in the recovery act, such standards would be of equal or greater stringency than the 2009 IECC for residential construction and the ASHRAE Standard 90.1-2007 for commercial construction. States would also have to demonstrate compliance with these standards in 90 percent of new and renovated residential and commercial building space by 2017 along with annual measurements of compliance rates.



Additionally, in 2008, DOE allocated \$227.2 million<sup>i</sup> in Weatherization Assistance Program (WAP) funds to improve the energy efficiency of existing low-income housing in Missouri.<sup>12</sup>

## STATE OVERVIEW

Missouri's population of 5,997,580 has grown steadily the past decade, rising by seven percent from 2000 to 2009, slightly below the national average rate of 9.1%.<sup>13</sup> This population occupies more than 2.6 million housing units throughout the state.<sup>14</sup>

Since Missouri is centrally located far from any mountains or oceans that would moderate temperatures, households experience extreme temperature differences throughout the year. Winter temperatures are below freezing and summers are hot and humid.

When compared to that of other states, Missouri's per capita energy consumption is average. Most energy is consumed in the residential and transportation sectors, and the economy is not considered energy-intensive. Missourians rely heavily on fossil fuels like coal, petroleum, and natural gas, but the state has very limited fossil fuel energy resources.

According to the Missouri Department of Natural Resources (DNR), Missourians used about 31 percent more fossil fuel in 2007 than in 1990, even as the state's population only grew 15 percent during the same period. To maintain this consumption level at its rate of population growth, imports of fossil fuel into the state would have to double between 2007 and 2050.

(<http://www.dnr.mo.gov/energy/utilities/eia-fossilfuel.htm>)

Energy prices in Missouri have historically been low<sup>15</sup> but are steadily rising, as is consistent with the rest of the country. (See Figure 2.) Missouri spends more than \$20 billion annually on energy, and imports nearly 95 percent of its primary energy sources.<sup>16</sup> Energy efficiency measures help ensure that dollars remain in state, improving the living standards of Missouri families.

## CONSTRUCTION OVERVIEW

Like most states, new construction has slowed significantly as a result of the recent real estate crisis. As Figure 3 illustrates, total residential housing unit permits were on a steady rise from 2000 and peaked at 33,114 permits in 2005. Since then, permitted units have been on a steady decline, bottoming out at 9,699 in 2010, a roughly 70 percent drop in the past five years.

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<sup>i</sup> Prior to the recovery act, Missouri received about \$6 million annually for weatherization services for more than 2,000 homes.



The reduced demand for new construction has caused many builders to go out of business or leave the market entirely. For example, the Kansas City Home Builders Association (KCHBA) has gone from about 1,800 members at its peak to under 1,000 today, and its staff was reduced from about ten to just two individuals.<sup>17</sup>

Figure 2 - Missouri Residential Electricity Prices<sup>18</sup>

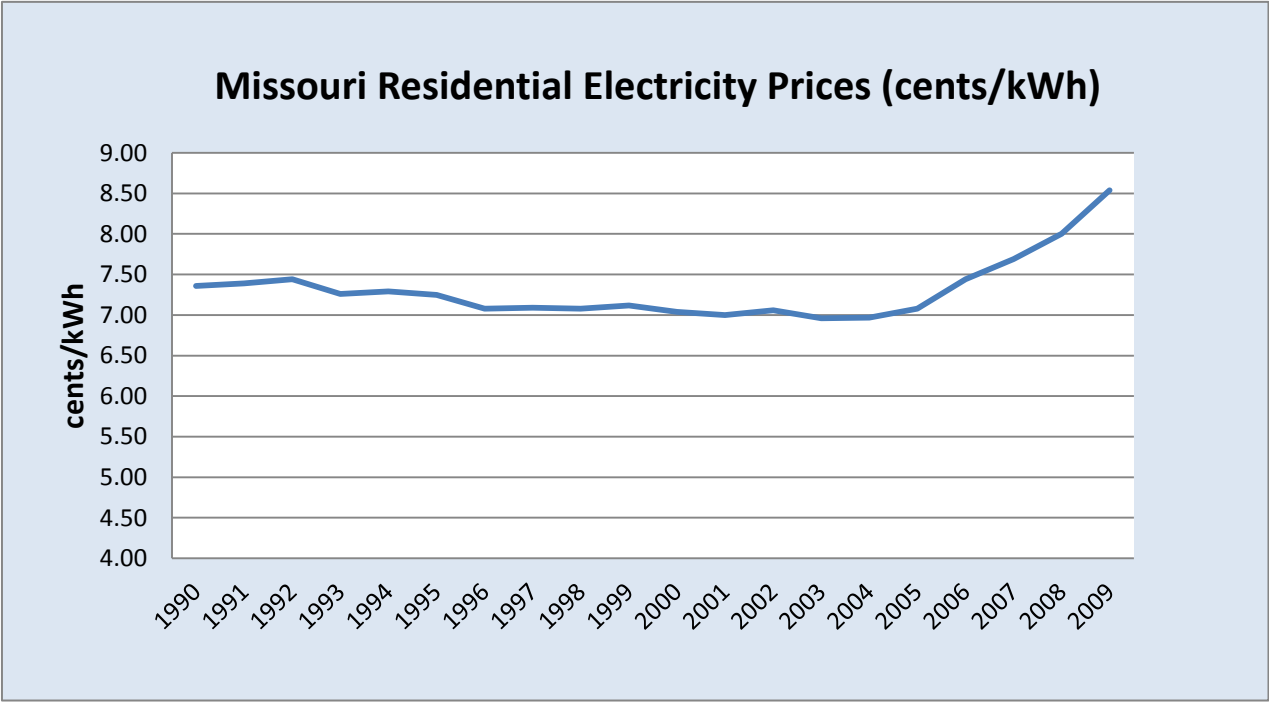
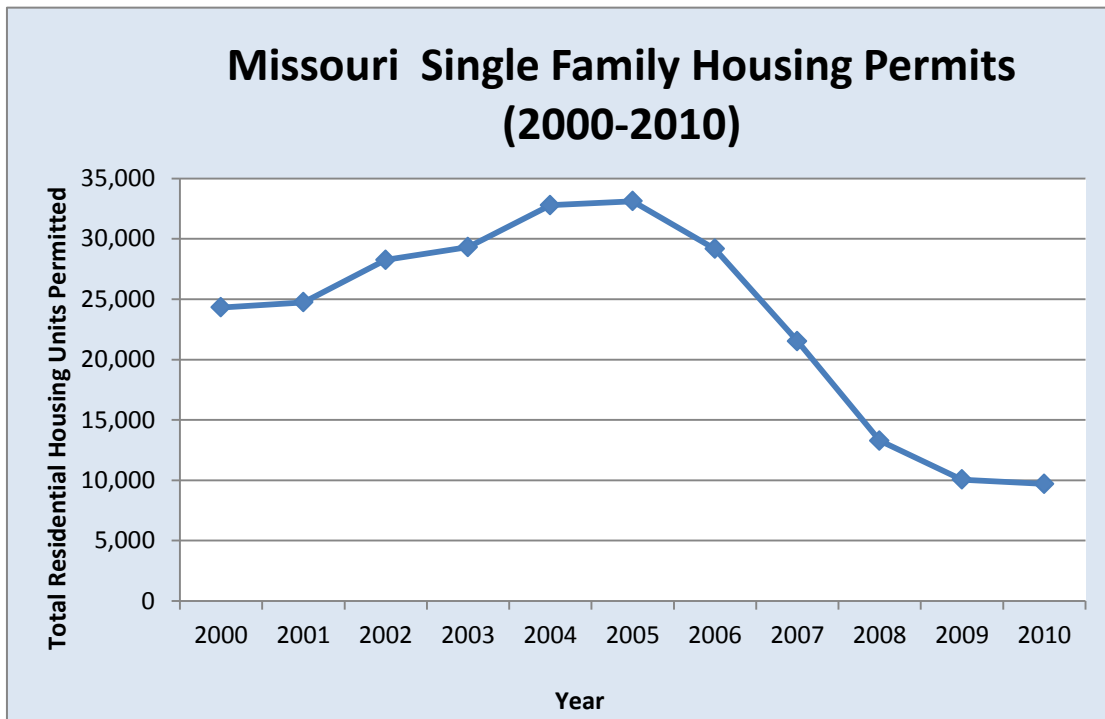




Figure 3 – Missouri Residential Housing Permits<sup>19</sup>



As builders leave the industry, those remaining may be more interested in gaining a competitive edge in the market by learning new approaches that will improve the quality of the homes they build, provide them with a way to differentiate their homes from those of competitors and/or enable them to construct buildings that will have lower energy bills and improve occupant comfort.

A construction industry that is suffering is not beneficial to the state's economy. It does, however, present a unique opportunity for the advancement of energy code policy in Missouri. While homebuilders, contractors, and code officials are spending less time in the construction process, they may have more time to spend learning the importance of, and how to comply with, the new standards. The communities of Missouri should take advantage of the unprecedented resources currently available to implement new code and provide support like education and training.

## STATE ENERGY PORTFOLIO

### PRODUCTION

Missouri is a minor energy producer, ranked 40<sup>th</sup> in the nation in total energy production with 179 trillion Btu,<sup>20</sup> or just 0.2 percent of the total national share.<sup>21</sup> Nuclear power dominates at 98 trillion Btu, just over half of Missouri's total energy production. Renewable energy production accounts for 74.5 trillion Btu and conventional fossil fuels account for 6 trillion Btu.<sup>22</sup> The state imports 95 percent of the conventional energy sources it consumes.<sup>23</sup>



Missouri generates 9.1 million MWh of electrical power, of which only 1.7 percent comes from renewable sources.<sup>24</sup> With the goal of increasing this share, the state adopted a renewable portfolio standard (RPS) in November 2008, which requires investor-owned utilities (IOUs) to steadily increase their renewable share towards the goal of 15 percent of total generation by 2021.<sup>25</sup>

## CONSUMPTION

Missouri consumers use an average amount of energy, coming mostly from the transportation and residential sectors.<sup>26</sup> Ranked 26<sup>th</sup> in energy consumption per person,<sup>27</sup> Missouri's per capita rate of 325 million Btu in 2008 closely mirrored the U.S. per capita rate of 327 million Btu. As a whole, the state consumed 1.9 quadrillion Btu, about 1.9 percent of the national total.<sup>28</sup>

In regards to natural gas usage, the U.S. Energy Information Agency (EIA) reported that "The residential sector accounts for nearly two-fifths of the State's natural gas consumption, with nearly three-fifths of Missouri households using natural gas as their primary energy source for home heating."<sup>29</sup>

## SOURCES

Coal is the dominant fuel source in Missouri, generating more than 80 percent of the state's electricity. Most of the coal – over 90 percent – arrives from Wyoming via railcar. The Callaway nuclear plant in Fulton supplies much of the non-coal-fueled power. Renewable energy sources, primarily produced by the state's three hydroelectric dams, account for the remaining electricity generation.

## CLIMATE PLANS

A growing number of states are developing climate change task forces to develop state climate action plans. A task force often brings together experts within the state to develop a comprehensive strategy to address climate change and members typically include state planners, policy analysts, natural resource specialists whose expertise range from energy, industry, transportation, agriculture, forestry, and waste.

### Excerpt From Kansas City's

#### *Climate Protection Report*

"The most effective opportunity for an average citizen to combat global warming is by making their buildings more efficient."<sup>1</sup>

While Missouri does not have an official climate action plan or Task Force at the state level, localized efforts to reduce energy intensity and greenhouse gas emissions are underway in several of Missouri's cities and counties. Although more detail is included in the Best Practices section of this report, the following climate and environment-related activities are also underway:

- Kansas City adopted a *Climate Protection Plan* (Ordinance No. 080754). Following the adoption of the plan, Kansas City set six environmental improvement goals<sup>30</sup> in 2009, which were supported through several resolutions and ordinances implemented by city departments and offices.<sup>31</sup> As one aspect of the plan, city facilities must attain U.S. Green Building Council's LEED<sup>32</sup> silver certification for new projects or renovations over 5,000 ft<sup>2</sup>. Thus far, the city is saving \$2 million annually as a result of the energy efficiency retrofits in municipal buildings.



- Columbia has an Office of Sustainability, funded over the last three years by the Energy Efficiency and Community Block Grant (EECBG) program<sup>33</sup>. Columbia performed energy assessments on their city-owned facilities and retrofitted buildings based on the recommendations.<sup>34</sup> The four newest city-owned buildings are either LEED-certified or are pursuing LEED certification. They include: City Government Center, Wabash Station, and two fire stations.
- Currently, five Missouri jurisdictions are members of International Council for Local Environmental Initiatives (now called ICLEI Global), an international association of local governments as well as national and regional local government organizations who have made a commitment to sustainable development.<sup>35</sup>
- Twenty-two Missouri mayors have signed the U.S. Conference of Mayors Climate Protection Agreement.<sup>36</sup>
- Multiple cities in Missouri participate in the Sierra Club’s Cool Cities Program. The program brings together community members, organizations, businesses, and local leaders to implement clean energy solutions that save money, create jobs, and help curb global warming.<sup>37</sup>
- The Southeast Missouri Climate Protection Initiative (SEMO PI) is a non-partisan community organization in Southeast Missouri that strives to reduce the release of greenhouse gases (GHG) into the global environment.<sup>38</sup> SEMO PI is merging with the League of Women Voters' Green Group. Current projects include recycling initiatives, task forces to help local governments adopt climate strategies and<sup>ii</sup> provide resources to help green businesses in southern Missouri, and on-going working groups to explore what individuals can do to reduce their impact on the global problem.<sup>39</sup>
- Faith-based climate initiatives are also underway in the state. The Southern Baptists Convention has engaged members in “study, reflection, and prayer related to the challenges presented by environmental and climate change issues,” and created a Declaration on the Environment and Climate Change<sup>40</sup> that consists of statements with supporting information found in the Bible as well as the Baptist Faith and Message, 2000 Version.<sup>41</sup> The Southern Baptists “urge all to follow by taking appropriate actions.”<sup>42</sup> Of the over 65 original signatories, four<sup>iii</sup> hail from Missouri.<sup>43</sup>

## STAKEHOLDERS

Missouri possesses a constellation of stakeholders who are invested in energy codes and building performance:

**The Missouri Department of Natural Resources' Division of Energy** works to protect the environment and stimulate the economy through energy efficiency and renewable energy resources and technologies. While the DNR is a regulatory agency for land, water, and air pollution, it is non-regulatory in regards to energy initiatives and has no authority over building codes.

<sup>ii</sup> SEMO PI has a task force to help the City of Cape Girardeau to develop recommendations on how the city can reduce its CO<sub>2</sub> emissions and energy consumption. These will be submitted to the City Council for

<sup>iii</sup> There are an additional 14 signatories that have signed the Declaration as individuals, organizations, and affiliations.



**The Missouri Office of Administration's Division of Facilities Management, Design and Construction** is responsible for the maintenance and operation of about 3,600 buildings in Missouri (not including higher education facilities, transportation, and conservation buildings), and for ensuring compliance with the state legislation and Executive Orders related to energy efficiency in-state buildings.

**U.S. General Services Administration (GSA)** owns and leases several buildings in the Kansas City area and around the state. It constructs, manages, and preserves government buildings and leases commercial real estate. GSA policies promote building management/operation best practices and efficient government operations.

**Home Builders Associations (HBAs)** members include builders, remodelers, developers, suppliers, manufacturers, architects, engineers, real estate brokers, lenders, attorneys and other industry professionals. Missouri HBAs include the HBA of St. Louis and Eastern Missouri, Greater Springfield, Greater Kansas City, Columbia, Central Missouri and Southwest Missouri.

**Regional planning organizations (RPO's), Metropolitan Planning Commissions and Council of Governments** are consortiums of local governments. As such, they develop regional consensus related to regional planning and development and may be good partners in disseminating information to local governments. In Missouri, some examples include: [Boonslick Regional Planning Commission](#), [East-West Gateway Coordinating Council](#) (St. Louis Region), [Green Hills Regional Planning Commission](#), [Harry S. Truman Coordinating Council](#), [Mark Twain Regional Council of Governments](#), [Meramec Regional Planning Commission](#), [Mid-America Regional Council](#), [Mid-Missouri Regional Planning Commission](#), [Mo-Kan Regional Council](#), [Northeast Missouri Regional Planning Commission](#), [Northwest Missouri Regional Council of Governments](#), [South Central Ozark Council of Governments](#), [Southeast Missouri Regional Planning & Economic Development Commission](#), [Southwest Missouri Council of Governments](#). Of special note, the **Mid-America Regional Council (MARC)** is a nonprofit association of city and county governments and the metropolitan planning organization for the Kansas City region, serving nine counties and 120 cities. In addition to other community assistance projects, it helps local communities by managing energy efficiency projects and programs, and leads the Regional Energy Efficiency and Conservation Strategy coalition (a coalition of 10 communities).

**The Missouri Chapter of the American Society of Heating Refrigerating and Air Conditioning Engineers (ASHRAE)** is the largest Chapter in ASHRAE, with over 1,200 members. The Region 6 chapter, which includes the St. Louis Chapter is interested in educating students as the next generation of energy professionals. They may be a good partner for state outreach and education efforts.

**American Institute of Architects (AIA)** and its four regional chapters (Kansas City, St. Louis, Springfield, and Mid-Missouri) represents the interests of architects and other design professionals around the state. AIA is interested in providing workshops on building codes and building science, including energy efficiency, as well as other events for members and public outreach.

**The Missouri Association of Counties (MAC)** provides assistance to its member counties in matters pertaining to local, state, and federal government activities. It promotes priority bills and monitors legislation, disseminates information to encourage improved government, provides a forum for exchanging ideas between governments. MAC could be an important partner in providing information to local policy-



makers about energy codes and could assist in disseminating training opportunities to counties throughout Missouri.<sup>44</sup>

**The Missouri Municipal League** is an agency that strengthens cities, towns and villages through unity and cooperation to improve municipal government and administration in Missouri. It is interested in supporting energy codes work by disseminating information to its members.

**The Missouri Association of Building and Fire Officials (MABFO)** serves as the statewide ICC chapter for code officials in the state, and has more than 1,000 members. There are eight regional chapters as well. Some include: **Missouri Association of Code Enforcement (MACE)** has about 200 members. MACE provides a venue for the exchange of ideas and information and training for its members during meetings, conferences, newsletters, and its website. It mainly serves individuals who enforce property maintenance, zoning, and nuisance codes and ordinances; **Missouri Association of Building Officials and Inspectors (MABOI)** has about 400 members. MABOI disseminates information to building, fire officials, and inspectors and the public, and provides education for its members and building officials through Missouri. MABOI is mainly focused on life, safety, and property through proper construction and inspection. It is a chapter of the International Code Council (ICC); **Missouri Association of Code Administrators (MACA)** provides a venue for the exchange of information between inspectors and an educational resource for those in the code enforcement field. ICC chapters may be good partners for training or may help the state support local adoption and enforcement efforts.

**The Missouri Public Service Commission** is responsible for matters related to safe and adequate utility service to customers by regulating utility rates, service and safety for investor-owned electric, gas, telecommunications, sewer and water companies, and manufactured housing, among other responsibilities.

**The Southeast Missouri Climate Protection Initiative (SEMO PI)** is a non-partisan community organization in Southeast Missouri. It helps reduce the release of greenhouse gases (GHG) into the global environment.<sup>45</sup>



## MISSOURI'S ENERGY CODE

### STATE ENERGY CODE

In the United States, building codes are adopted on the state and local levels. The process differs from state to state, but in most cases codes are adopted through a legislative process, a regulatory process, or a combination of both, although a handful of states—Missouri among them—are considered “home rule” in regards to building codes meaning codes are primarily adopted at the local level.

Missouri currently does not mandate a statewide energy code for all residential or commercial buildings. While not feasible in all states, statewide codes offer benefits, including standardizing training and resources for builders working across jurisdictions, and a standard quality baseline for home buyers and building owners. In Missouri, only the Missouri General Assembly is authorized to enact legislation to establish statewide building construction regulations and/or authorize a state agency to do so.<sup>iv</sup> However, there currently is no state regulatory agency authorized to promulgate, adopt, or update construction codes on a statewide basis.

State-owned or leased buildings, however, are required to meet certain energy codes. New state buildings over 5,000 square feet, substantial renovation of state buildings over 5,000 square feet when major energy systems are involved, or buildings over 5,000 square feet which the state or state agency considers for acquisition or lease must meet a statewide standard at least as stringent as the 2006 IECC.<sup>v46</sup> State-owned single-family and multi-family residential buildings must comply with the latest edition of the MEC or ASHRAE Standard 90.2-1993.<sup>47</sup>

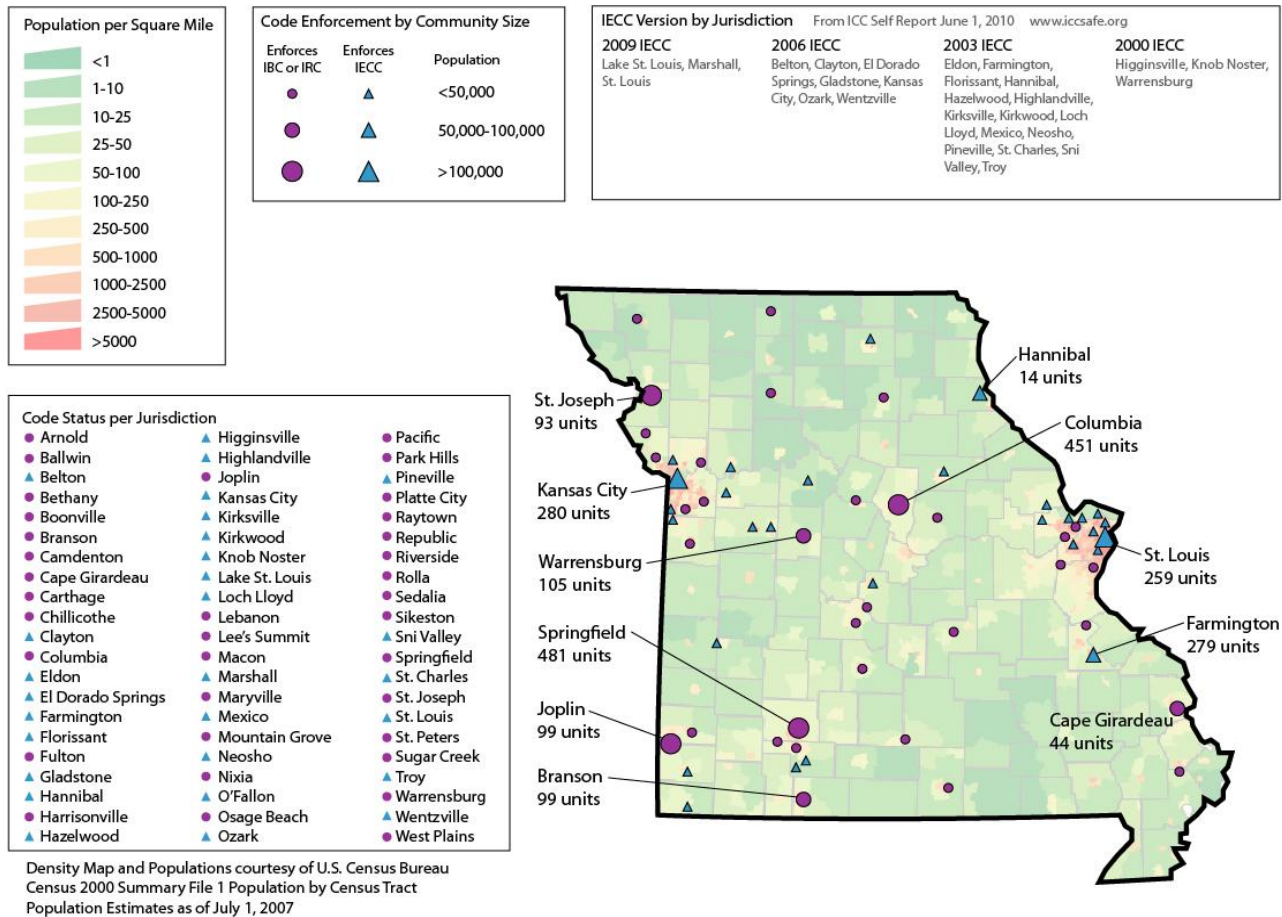
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<sup>iv</sup> Missouri has considered adopting a state code. For example, SB 745, drafted by BCAP in 2010, would have adopted the 2009 IECC and ASHRAE Standard 90.1-2007 statewide. It also would have directed DNR to establish an automatic review cycle, either every three years or within nine months of the publication of a new model code version. In addition, HB 938 in 2011 would have established most of the 2006 International Code series as minimum statewide construction standards (the 2006 IECC was not specifically cited, but would have been included via its position as an alternative compliance path to Chapter 11 of the 2006 International Residential Code). Both bills, however, failed to move past the committee stage. For more information see SB 745 (2010), Missouri General Assembly. For more information see [http://www.senate.mo.gov/10info/BTS\\_Web/Bill.aspx?SessionType=R&BillID=3164368](http://www.senate.mo.gov/10info/BTS_Web/Bill.aspx?SessionType=R&BillID=3164368)

<sup>v</sup> The Commissioner of the Office of Administration may exempt any state building from meeting the minimum energy efficiency requirements for safety reasons or when the cost is expected to exceed the energy cost savings.



**Figure 4: Local Energy Code Adoption in Missouri**



The following jurisdictions have adopted an energy code: Belton (2006 IECC), Cass County (2000 IECC), Christian County (2006 IECC), Clayton (2006 IECC), Columbia (2009 IECC (weakened; pending)), Eldon (2003 IECC), El Dorado Springs (2006 IECC), Farmington (2003 IECC), Fenton (IECC), Florissant (2003 IECC), Gladstone (2006 IECC), Hannibal (2003 IECC), Hazelwood (2003 IECC), Higginsville (IECC), Highlandville (2003 IECC), Jackson County (2009 IECC), Jefferson County (2003 IECC), Kansas City (2006 IECC), Kirksville (2003 IECC), Kirkwood (2003 IECC), Knob Noster (IECC), Loch Lloyd (2003 IECC), Marshall (2009 IECC), Mexico (2003 IECC), Neosho (2003 IECC), O'Fallon (2009 IECC), Ozark (2006 IECC), Pineville (2003 IECC), Platte County (2006 IECC), St. Charles (2003 IECC), City of St. Louis (2009 IECC), Sni Valley FPD (2003 IECC), Troy (2003 IECC), Warrensburg (2000 IECC), Wentzville (2006 IECC).

\*The above may not be a complete list. Many of the codes shown above include amendments that weaken the model code.

\*Some additional jurisdictions have adopted building codes (such as IRC or IBC), including the chapter on energy (e.g. Independence, St. Louis County), and some jurisdictions are working to adopt energy codes (e.g. Creve Coeur (2009 IECC) and Independence (2012 IECC)).

Source: ICC website. International Code Adoptions (Missouri) <http://www.iccsafe.org/gr/Pages/adoptions.aspx>; Mid-America Regional Council report *Impact of International Energy Conservation Codes on Energy Consumption and Expenditures in the REECS Community*; and direct communication with some jurisdictions.



While not a code per se, the state has required, since 1993, a life-cycle cost analysis for all new construction of state buildings and major renovations<sup>vi</sup> of existing state buildings when major energy systems are involved. The life-cycle cost analysis requires using a 25-year time horizon and must include analysis of all commercially available technology, including renewable energy systems.

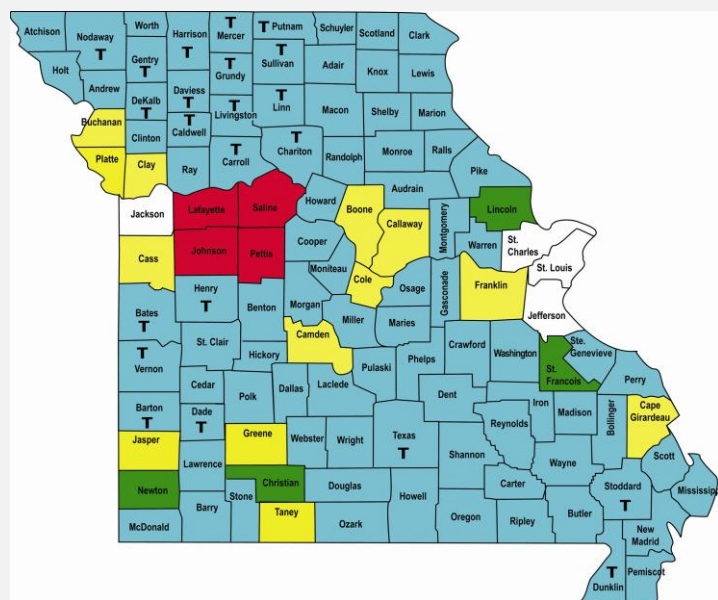
**Gap #1: Due to its tradition of strong local governments, Missouri has not adopted a statewide energy code. The state reflects a patchwork of different codes that lack consistency among jurisdictions.**

#### ADOPTION PROCESS

Energy code policies are adopted and implemented individually by municipalities throughout Missouri. While there is no standard adoption process, in research for this report, BCAP found it is common for a city building official to develop and present a code update or adoption ordinance to the city's legislative body for debate. Approval of the proposed code measures takes place in Kansas City, Independence, Grandview, St. Louis (city and county), and Creve Coeur.

In Missouri there is a well-defined relationship between state and local governments, including separate and concurrent powers for each as outlined in state statutes and through established legal rulings. The state grants authority to certain local jurisdictions to adopt building and construction regulations; require building permits; license certain building contractors; require inspections; establish and collect fees

**Figure 5 – Missouri County Classification Map**



#### Missouri Association of Counties Key To Data

- Classification 1** -- Charter...counties with a charter form of government.
- Classification 1** -- Non-Charter...assessed valuation of \$900 million and over after the county has maintained such valuation for five years.
- Classification 2**...assessed valuation of \$600 million and over (but less than \$900 million) after the county has maintained such valuation for five years.
- Classification 3**...assessed valuation of less than \$600 million.
- Classification 4**...Classification 2 counties, which would otherwise return to Classification 3 because of changes in assessed valuation, but which attained Classification 2 prior to August 13, 1988 and operate under the laws of Classification 2.
- T **22 Township Counties**....(#)= the number of townships in the county.

Map courtesy of the Missouri Association of Counties,  
<http://www.mocounties.com/countyinfo/>

<sup>vi</sup> Substantial renovations mean projects that will affect at least 50 percent of the building's square footage or cost at least 50 percent of its market value. The analysis must include the initial construction costs and the proposed energy consumption, operation, and maintenance costs over 25 years. Plans must be reviewed by the Director of the Division of Design and Construction within the Missouri Office of Administration to assure that the final design has the lowest life-cycle cost possible, while still meeting the needs of the occupants.



for permits, licenses, and inspections; and appoint a building commission to oversee these regulations, permits, licenses, and inspections.<sup>48</sup> The unique system for determining which cities and counties are granted such authority is described below.

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## COUNTY GOVERNMENTS

County governments can be considered “general-purpose governments” as they have broad responsibilities. Not all counties are granted the authority to adopt codes -- the state has a unique system of classifying counties based on the assessed value of the property (over a five year period) in each county. As shown in Figure 5 above, there are four county “classes” in Missouri. Of the 114 counties<sup>vii</sup> in Missouri: 17 counties are considered Class 1; four counties are considered Class 2; 89 counties are considered Class 3; and four counties are considered Class 4.<sup>49</sup> As only Classes 1, 2, and 4 have been granted the authority to adopt codes, about 80 percent of counties do not have authority to do so.<sup>50</sup>

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## MUNICIPAL AND CITY GOVERNMENTS

Municipal governments are classified differently. There are about 750 municipalities<sup>viii</sup> in Missouri.<sup>51</sup> There are five classes of municipalities, based on population:

Class	Population	Number of municipalities in class
Class 3 municipalities	3,000-29,999	about 56
Class 4	500-2,999	about 550
Villages	under 500	about 300
Constitutional Charter		about 40
Legislative Charter (or “statutory”)		6

State laws designate the forms of government available to municipalities based on their classification. Those municipalities with a Constitutional Charter (also considered by some as “home rule”) may adopt any form of government as voted upon. Only municipalities with a population over 5,000 can choose to become “home rule”. Of the more than 60 cities eligible to become “home rule”, only about 40 have chosen to do so. ***All municipalities in Missouri are authorized to adopt codes if they choose to.***<sup>ix</sup> However, of the 750 viable municipal governments eligible to adopt an energy code, only 34 have.<sup>52</sup>

**Gap #2: To date, many local jurisdictions in Missouri have not adopted an energy code.**

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<sup>vii</sup> The city of St. Louis is an independent city not within the limits of a county.

<sup>viii</sup> While there are officially about 900 cities in Missouri, some are so small that they’ve stopped operating as a city (electing officials, etc.).

<sup>ix</sup> A city may adopt a code even if located in a county that’s not authorized to do so.. The county only has jurisdiction in un-incorporated portions of the county.



**Gap #3: Because a large share of counties are not authorized to adopt building codes, many unincorporated, rural areas of the state are unable to adopt an energy code.**

## POLITICAL ENVIRONMENT

### POLITICAL CULTURE

Based on BCAP discussions with Missouri stakeholders, Missouri's political culture reflects a sense of cooperation among jurisdictions, the expectation of independence from state authority on most issues, and the firm belief that local governments do a better job of delivering services to their constituents. Most local jurisdictions exercise considerable authority from state intervention, and local regulations supersede state law on issues of purely local importance.

Diverse opinions about energy codes exist in Missouri. BCAP conducted in-depth interviews with state government officials, home builders, code enforcement associations, municipal and county associations, other stakeholders, and code enforcement personnel in Des Peres, Kansas City, Grandview, Independence, Columbia, St. Louis, Creve Coeur, Kirkwood, Excelsior Springs, Kirksville, Poplar Bluff, West Plains, Cape Girardeau, St. Louis city, St. Louis county, Springfield, St. Charles city, St. Charles county, and University City. The vast majority of these contacts believe that the passage of a statewide energy code is highly unlikely at this time.

In some jurisdictions, particularly those in larger metropolitan areas, code enforcement officials appreciate that the state has not adopted an energy code, and view the idea of a statewide code as an infringement on their authority to choose their own building and energy codes. As one official said: *"The lack of a statewide code acts as a 'firewall' to keep the state out of local business."* Builders shared key arguments against energy codes at either local or state levels:

- **Builders are already doing a good job and don't need additional regulation.** As a regional HBA representative said: *"There are good builders building good homes... the industry is already marching in that direction – why poke these good folks?"* and *"The construction industry is a highly regulated industry already."*
- **"It's too expensive."** Builders worry that the additional cost for more energy efficiency will add thousands of dollars to the cost of a new home and reduce the pool of potential buyers, in an already declining market. As an HBA representative said, *"For every \$1,000 added to the cost of a new home, it out-prices 400 potential buyers."*<sup>x</sup> Builders interviewed for this report consistently emphasized that lenders need to be educated on how energy efficient homes save owners money, and they should allow buyers to qualify for higher mortgage amounts to overcome this barrier.

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<sup>x</sup> BCAP was not provided with data about this claim. It is noteworthy that nascent efforts from some lenders to originate energy efficient mortgage products may be used to qualify buyers for higher loan amounts in anticipation of lower utility bills.



- **Codes should be used to regulate health and safety only.** Proponents of this argument fear that product manufacturers lobby for more stringent codes in order to sell more of their product. As one HBA representative said *“...our members’ view is that the building code is best when it’s used for regulating basic health, safety of structures. It’s a handy tool for advancing higher building in a variety of ways, and in some ways codes have been hi-jacked by manufacturers of items that can be required by codes so they can sell more product. To the extent that it’s not focused on that, we’re very much for energy efficiency, and our members embrace that.”* One enforcement official reported that builders say: *“We’ve got one of the lowest energy rates in the state – why do we need to insulate when rates are so low?”*
- **Resistance to change.** As one HBA representative said, *“they’re [builders] resistant to change”*. An enforcement official interviewed for this report said that buyers and builders recognize the value of energy efficiency but that builders *“aren’t going to do it unless they have to.”*

In many less populated jurisdictions, especially those with building markets that span incorporated and unincorporated areas, often code department staff are strongly supportive of one set of uniform standards developed at the state level in order to stop builders who threaten to take their business to unincorporated areas within the county, where building codes are often nonexistent. Those in favor of energy codes at either local or state levels have stated the following reason for statewide adoption:

- **Increased builder accountability and construction oversight.** As one code official interviewed for this report said: *“... irresponsible builders who want to avoid codes know they can avoid oversight by building in unincorporated areas of the state.”* Another said, *“Some people don’t want to build here [because of building codes] so they’ll go to an adjacent city or county where there’s no building code.”* Another said, *“We live in a 3<sup>rd</sup> class county with no regulations on building at all. So when we restrict what they build in the city, it pushes building out to the county... a statewide code would be helpful so that cities and counties are on an even playing field and don’t have to debate it within our own city council.”*

While BCAP recommends a statewide code, the complete and successful implementation of such a code may be challenging. As well, many states have found ways to achieve high levels of code compliance without adopting at the state level. As a result of these factors, this report will focus on how local jurisdictions can progress forward and on what help these jurisdictions will need to do so:

- **Support for stakeholders at the local level.** Some code enforcement officials feel that they are a lone voice promoting better building standards and that a state code would *“take the pressure off”* by passing a statewide code. They feel that the responsibility to educate local policy-makers (who typically aren’t well versed on the topic of building codes, and don’t have time to learn about them) falls to them and that they are left to fight homebuilders and others who opposed more stringent codes. Said one: *“If someone could come here and present the information, that would help me not just be the sole voice trying to get people to change, with many voices against me with reasons why not to.”*
- **Education.** There is a lack of understanding of the benefits of energy codes. As one code enforcement professional said: *“Consumers don’t demand energy efficiency. Consumers demand*



*granite counter tops, but assume that if a home is new, it must be energy efficient... they don't know they have a choice and can ask for additional insulation, a more efficient heating system, or better windows."* Other code enforcement officials said that attitude is rapidly changing, and that a vast majority of buyers desire energy efficiency, but don't know how to demand it. As one code inspector put it: *"Education to the general public would be important – construction costs for energy efficiency is less than 10 percent of a project. The general public would benefit greatly from education."* Another said: *"Education goes a long way. There's no education required for builders, and lots of old school building techniques – from amount of insulation - they use less than minimum required by an energy code- lots of leaky homes, I'm sure there's a lot of energy consumption. I've heard homes that are 1500 ft<sup>2</sup> costing \$500 in electric [bills] per month in winter."*

- **Facts and Figures.** Misinformation is prevalent in the building community and often repeated in mass media. Local enforcement professionals say that "facts and figures" to support energy code adoption would be extremely helpful as they educate elected officials, builders, property owners and buyers, reporters, and others to make the case for modernizing an energy code. As one Chief Building Official from Columbia said *"There is great disagreement over the cost of the code."* Another said: *"The suburban journals write: 'By adopting the 2009 IECC Residential Code... it will cost between \$7,000-10,000 more to build a house'... we need immediate assistance to respond to such articles."* According to one Chief Building Official, data is critical: *"the mayor and council love numbers and trust our department."*
- **Better quality control.** As one code official in a rural jurisdiction said: *"People tell me 'I paid \$140,000 [for this home] and we didn't realize that when we flushed the toilet it just went underneath the house.'"*

**Gap #4: Despite the familiarity of many code officials, there is a lack of information regarding the energy code at the local level. In particular, local governments would benefit from additional resources regarding code compliance.**

**Gap #5: There is a lack of public demand for energy efficiency in buildings.**

**Gap #6: There is a lack of political support at the local government level to "champion" energy codes. BCAP has found that areas that have a local champion (whether within a building department or other political figure) are much more successful in implementing the energy code.**

## POTENTIAL SAVINGS FROM ENERGY CODES

### RESIDENTIAL BUILDINGS

Missouri home owners would save significant money if their homes were built to the latest energy code, the 2009 IECC. According to BCAP research, if new homes in Missouri were built to the latest code, the 2009 IECC, incremental costs to build new homes to the 2009 International Energy Conservation Code (IECC) in Missouri will conservatively add no more than a total of approximately \$1,519 (in climate zone 4) to \$3,665 (in climate zone 5) to the cost of a new home—although this figure could increase or decrease depending on



local practices. Following statewide analysis conducted by DOE<sup>53</sup>, these estimates assume that the statewide baseline of current practice is equivalent to the prescriptive code requirements 2003 IECC. To calculate baseline and incremental construction costs, these estimates rely on a construction data source, *RS Means Residential Cost Data 2011*, in order to approximate baseline cost and the costs of specific building component changes.<sup>54</sup>

According to this analysis, compliance with the 2009 IECC represents a nominal 0.6% increase to the retail price of an average new home in climate zone 4 and 1.4% in climate zone 5<sup>xi</sup>—an incremental cost which is fully paid off within 14 or 24 months, for climate zones 4 and 5, respectively. This analysis is based on the following assumptions:

- \$337 and \$559 in annual energy savings for climate zones 4 and 5, respectively
- Mortgage particulars: 20% down payment, 30 year term, 5.05% interest rate

It is worth noting that this conservative break-even scenario is subject to significant fluctuations in input variables. For example, facing the prospect of rising energy costs, both payback and break-even on the incremental cost of code improvements would be accelerated significantly. Similarly, variations in lending interest rates and required money down would each alter this projection. Increases in incremental cost would also increase payback time, whereas decreases in incremental cost, such as the choice not to insulate basement ceilings in climate zone 5, would speed up payback time. For more details on incremental cost estimates for Missouri, see the Missouri Policy Action Toolkit.

**Table 1– Annual Savings in Residential Energy Costs**

Savings Current Practice vs. 2009 IECC		
Climate Zone (City)	Annual Savings per New Home	Percent Energy Savings
Climate Zone 4 (St Louis, MO)	\$337	18%
Climate Zone 5 (St Joseph, MO)	\$559	26%

Source: [2009 IECC Residential Nationwide Analysis](#), U.S. Department of Energy, lowered to reflect current electricity and natural gas prices in Missouri



## COMMERCIAL BUILDINGS

The following table shows the potential energy savings that can be achieved by select commercial building types if they were built to the latest commercial building standard, ASHRAE 90.1-2007. The statewide baseline is assumed to be ASHRAE 90.1-1999. Modeled by DOE, these modeled energy savings are greatest for mid-rise office buildings.

According to BCAP's analysis, and assuming Standard 90.1-1999 as the baseline standard for the analysis, if Missouri began implementing the 2009 IECC and Standard 90.1-2007 statewide in 2011, businesses and homeowners would save an estimated \$99 million annually by 2020 and \$200 million annually by 2030 in energy costs (assuming 2006 prices). Additionally, implementing the latest model codes would help avoid a cumulative total of about 31 trillion Btu of primary annual energy use by 2030 and annual total emissions of more than 2.1 million metric tons of CO<sub>2</sub> by 2030.<sup>55</sup>

**Table 2— Potential Annual Energy Savings for Commercial Buildings**

Construction Type	City (Climate Zone)	Energy Savings	Cost Savings
Office Building	St Louis (CZ 4)	11.2%	11.4%
Residential Multifamily	St Louis (CZ 4)	3.5%	2.2%
Semi Heated Warehouse	St Louis (CZ 4)	0.5%	0.3%
Office Building	St Joseph (CZ 5)	10%	10.1%
Residential Multifamily	St Joseph (CZ 5)	3.6%	2.3%
Semi Heated Warehouse	St Joseph (CZ 5)	0.4%	0.3%

Source: [Impacts of Standard 90.1-2007 for Commercial Buildings at State Level](#), U.S. Department of Energy

## RECENT LEGISLATION AND RULES

Because most building energy code regulations are adopted at the local level, there has been limited statewide legislation and rules that directly affect energy codes.

In 2008, the Missouri legislative body passed (SB 1181) a ruling that directs the DNR to establish minimum energy efficiency standards for certain new and renovated state building construction projects begun after July 1, 2009.<sup>56</sup> More specifically, new state buildings over 5,000 ft<sup>2</sup>, substantial renovation of state buildings over 5,000 ft<sup>2</sup> when major energy systems are involved, or buildings over 5,000 ft<sup>2</sup> which the state or state agency considers for acquisition or lease must meet a statewide standard at least as stringent as the 2006



IECC. The Commissioner of the Office of Administration may exempt any state building from meeting the minimum energy efficiency standard requirement for safety reasons or when the cost of compliance is expected to exceed the energy cost savings.<sup>57</sup> As well, state-owned single-family and multi-family residential buildings must comply with the latest edition of the MEC or ASHRAE Standard 90.2-1993.<sup>58</sup>

In April of 2009, Governor Nixon issued an Executive Order (09-18) directing all state agencies under the supervision of the Office of Administration (OA) to institute policies to reduce energy consumption by 2% annually for the next 10 years.<sup>59</sup> The Executive Order also specifies that all new state construction, buildings being constructed for lease by the state, and significant renovations and replacement of energy-using equipment shall be at least as stringent as the most recent energy efficiency standards of the IECC.<sup>xii</sup> While such goals have thus far been met primarily through operational changes, it will be more difficult in future years to achieve additional savings as the OA is operating in an emergency life/safety mode only. “We can only afford to repair things as they break,” said one representative interviewed for this report. The OA oversees about 3,600 state buildings which draw annual energy bills totaling approximately \$48 million. While OA has identified energy projects they would like to invest in, it is not possible unless the state allocates dollars for making energy efficiency improvements. The OA has invested millions in improvements to existing state buildings through Energy Service Companies (ESCOs), and this has reduced energy bills for some buildings. Unfortunately, due to budget cuts, the state has not been able to monitor such buildings and normalize the data for changes in weather, facility operating hours and other variables, so it is unable to quantify the amount of energy savings that it has achieved through these efforts.

In 2009, the Missouri Energy Efficiency Investment Act (SS SCS SB 376) was passed, which encourages utilities to invest in demand-side resources by directing the Missouri Public Service Commission (PSC) to allow electric utilities to implement and recover costs (and potentially receive performance incentives) for PSC-approved energy-efficiency programs for customers. This will save utility customers money, as the incremental costs of energy-efficiency programs often can lessen peak loading on the electrical grid and avert or delay the capital costs of power plant construction.<sup>xiii</sup> Rules were effective beginning in June 2011, at which time the four utilities affected by the Act can submit proposals to the PSC. Significantly, when interviewed the PSC expressed its willingness to consider proposals that educate the construction industry to encourage more energy-efficient buildings.

As well, Missouri has adopted a renewable portfolio standard (RPS) that requires investor owned utilities to provide five percent of electricity from renewable sources by 2011; 10 percent by 2018; and 15 percent by 2021.<sup>60</sup> Energy efficiency does not count toward RPS goals, although other states have allowed utilities to receive credit for efficiency efforts. Due to the relatively low costs of efficiency programs compared to new renewable energy sources, many utilities in other states have advocated for this strategy. If permitted in Missouri, such a program would further aid local code compliance efforts.

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<sup>xii</sup> Exemptions are limited to those listed in the IECC and those approved by the Director of Facilities management, Design and Construction.

<sup>xiii</sup> Prior to the passage of SB 376, energy efficiency was not treated as a generation source – that is, the cost of building new power plants could be recovered, but energy efficiency programs could not, making energy efficiency a more expensive business option for utilities.



Additionally, in July 2010, the Missouri Legislature enacted the "Property Assessed Clean Energy Act" which allows municipalities to create Clean Energy Development Boards, and develop local Property Assessed Clean Energy (PACE) programs to finance cost-effective energy efficiency or renewable energy improvements for buildings.

**GAP #7: While possessing numerous state actions in the realm of energy conservation, Missouri lacks legislation or rules that could provide enduring funding to enlarged energy code efforts at the state level.**

## IMPLEMENTATION

Traditionally considered “home rule” based in regards to the energy code, the state has not offered training, support, or measurement and verification to local jurisdictions. However, the DNR has begun a dialogue with authorized communities that have the authority to adopt energy standards. Through its contract with BCAP, DNR is providing support for energy code adoption, compliance and enforcement to local jurisdictions and will also offer building code workshops through its State Energy Program contract implementer. The workshops will be offered statewide for builders, contractors, and county officials administering codes. Local jurisdictions may also benefit for additional state assistance:

- The Missouri Energy Revolving Fund Loan Program, administered by the Division of Energy in the Missouri Department of Natural Resources (DNR), provides loans for energy efficiency improvements for public and governmental buildings such as public schools, colleges and universities, and city and county governments. Loan amounts are based on projected energy savings from implemented energy codes. The savings from lower energy bills can be used to repay the loan. In 2010, \$10 million was available. Since the program's inception in 1989, loans totaling over \$80 million have been issued through this program, resulting in an estimated \$146 million in cumulative energy savings.
- The DNR recently encouraged use of third-party verification programs under its “Energize Missouri Homes” program (funded via ARRA), which offered rebates up to \$17,000 for energy audits, whole-house energy saving improvements, and geothermal systems. As part of this program, the DNR developed a list of about 185 certified Home Energy Auditors.<sup>61</sup> The funds were reserved in less than two months, and were used to upgrade more than 730 homes. The state continues to support third-party auditors through a tax deduction incentive of up to \$2,000 for individuals to offset the cost of getting an energy audit and making energy improvements.

## COMPLIANCE

Most design and construction professionals will respond to the importance placed on codes by the local inspection departments. In jurisdictions where compliance is expected, industry professionals will seek out training for their staff and work with plans, examiners, and building inspectors to follow the intent of energy code provisions. In jurisdictions that do not place a high priority on energy codes, building professionals follow suit and comply with the code only to the minimum extent necessary, if at all. BCAP research shows



that compliance with code provisions is often stronger among builders in urban areas than rural ones. Above all, strict, consistent enforcement practices improve compliance.

Building professionals comply with or exceed energy code requirements for a variety of reasons: a desire to produce high-quality structures; to gain financial incentives; or to abide simply because codes are the law. Others regard energy codes as unnecessary and/or costly regulations regardless of local or state pressure, support or incentives. Many others would be more receptive to compliance, but they lack the training or do not view energy codes as integral to occupant life, health, and safety.

While builders can choose to build more efficient homes and differentiate themselves from competitors in the market, minimum building and energy standards are designed to protect owners from high energy bills over the lifetime of the structure. Addressing energy efficiency at the time of new construction is most economical; it is much more difficult and expensive to go back and add insulation once the drywall has been hung.

**Gap #8: There is a widespread lack of education in the construction industry about building energy efficient buildings.**

**Gap #9: At present, there is not a method in place to measure and evaluate compliance with the energy code. It should be noted that this is likely to change in response forthcoming ARRA-mandated compliance measurement efforts now being considered.**

#### TRAINING AND CONTINUING EDUCATION UNITS FOR CONSTRUCTION TRADES

In Missouri, very few construction trades require licensure. The **Missouri Board for Architects, Professional Engineers, Professional Land Surveyors & Landscape Architects (APELSLA)** oversees the licensing for 4,557 active architects; 15,069 active professional engineers; 917 active land surveyors; and, 348 active landscape architects. Architects, engineers, land surveyors, and landscape architects must renew their license every two years (renewal license fee is \$35) and, within the two years immediately preceding the renewal date, architects and landscape architects must have obtained 24 Continuing Education Units (CEUs); engineers 30 Professional Development Hours (PDHs); and, land surveyors 20 Professional Development Units (PDUs). At the state level, plumbers, electricians, contractors, and builders are not required to be licensed.



The historic Wabash Station in Columbia, Missouri is the main hub of Columbia Transit.

**Gap #10: Builders are not required to be licensed or certified at the state level nor obtain continuing education credits. There are currently no statewide requirements for energy code training, certification, or CEUs for any building trades professionals. It should be noted that many local governments do require some of these requirements.**



## THIRD PARTY PROGRAMS

Where a building is being built to a higher level than required by code such as to attain LEED certification or ENERGY STAR criteria, a third-party professional certifies that the building complies with specific requirements. At present, efforts are emerging in a handful of municipalities in Missouri are beginning to utilize third-party or other above-code programs such as Building America, ENERGY STAR, LEED for Homes, or the NAHB's green rating program.

### LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN (LEED)

The U.S. Green Building Council's (USGBCs) Leadership in Energy and Environmental Design (LEED) Green Building Rating System is a nationally accepted benchmark for the design, construction, and operation of high performance green buildings. Of the 7,431 LEED certified buildings in the U.S., 103 are located in Missouri. The USGBC Gateway Chapter, located in St Louis, has more than 600 members representing construction and real estate professionals. In Columbia, the four newest city-owned buildings are either LEED-certified or are pursuing certification: City Government Center, Wabash Station, and two fire stations.<sup>62</sup>

#### Why Above-Code Programs Matter

Advanced codes and standards help to transform the marketplace by bringing high performing buildings into the mainstream. They also raise awareness of energy- and resource-efficient design for the public, as well as design and building professionals and code officials. Finally, they raise the bar for building energy performance, which, in turn, accelerates and shapes the development and adoption of future model codes.

### ENERGY STAR FOR HOMES<sup>63</sup>

New ENERGY STAR qualified homes are at least 15 percent more efficient than typical new homes. According to the ENERGY STAR website, there are 46 entities that conduct ENERGY STAR ratings in Missouri.<sup>xiv</sup>

According to the ENERGY STAR website, there are 2,028 ENERGY STAR qualified homes built to date in Missouri. Of those, 719 were built in 2010. There are also 92 ENERGY STAR partner builders, including five that have committed to build 100 percent of their homes to the latest ENERGY STAR recommendations.

The Home Performance with ENERGY STAR program is available to consumers in at least three cities:

- Kansas City: Kansas City Power & Light (KCP&L) offers rebates up to \$600 for duct/air sealing, insulation, windows and doors, with additional rebates up to \$600 for space and water heating systems available through the Missouri Gas Energy program<sup>64</sup>;
- Columbia: Customers of Columbia Water & Light can get rebates up to \$1,200 for home improvements and up to \$1,600 for high-efficiency air conditioners or heat pumps<sup>65</sup>;
- St. Louis: offers limited rebates.<sup>66</sup>

<sup>xiv</sup> The Residential Energy Services Network (RESNET) provides federally recognized third-party rating services to assess building energy performance, and provides a list of certified energy raters on their website – 19 of these organizations or companies are registered with RESNET at [www.natresnet.org](http://www.natresnet.org).



Since 1994, the U.S. Department of Energy's (DOE) Building America program has been raising the bar of energy efficiency and quality in new and existing homes by working with national laboratories and the residential building industry to improve the quality and performance of today's homes while continually advancing the frontier for homes of the future – homes that will ultimately produce as much energy as they use. The program's innovative construction approaches can **reduce a home's average energy consumption by as much as 40 percent with little impact on the cost of new construction**. By designing a house as a system, various energy-related components work together to maximize efficiency at the lowest cost. Building America has worked with builders to utilize innovative technologies and strategies in more than 42,000 high quality, energy-efficient homes. Through Building America's "Builders Challenge" program, new homes today that meet the Builders Challenge qualifications can earn an "Energy Smart Home Scale" label. These homes typically sell within weeks while other new homes sit on the market for months.

The Builders Challenge is similar to the ENERGY STAR for new homes program in that both programs assist and reward builders who build homes that are more efficient than typical new homes. However, the energy threshold requirements for the Builders Challenge program are different than the Energy Star new homes program.<sup>xv</sup> Building America training can help Missouri builders improve the housing stock and help builders embrace high-performance building technology and approaches.<sup>67</sup>

**Gap #11: The use of third party, above-code energy efficiency programs at the local level is limited and could be expanded.**

## ENFORCEMENT

In research conducted for this report, we learned that code enforcement personnel take their jobs seriously, tend to keep their jobs for many years, and understand that their role is to protect buyers and the general public by ensuring, through inspections, that buildings are built safely. They have experience with failed buildings and understand the importance of building occupant health and safety. Most code enforcement personnel expressed a desire to learn more about the energy code.

While enforcement is a local issue, states play a crucial role in providing municipalities with the resources and support they need to establish effective enforcement infrastructures and practices. As codes are continually updated over the years, it is incumbent on states and cities to provide the enforcement community with access to sufficient energy code training.

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<sup>xv</sup> The HERS Index is a scoring system that provides a scale for measuring the energy efficiency of a new home compared to a reference home that was built to the 2004 IECC, which is assigned the score of 100 points. The lower a home's HERS Index, the more energy efficient it is. For every 1 point decrease in the HERS Index it corresponds to a 1percent reduction in energy consumption compared to the HERS reference home. For example, a home that scores 85 is 15percent more efficient than the HERS reference home, and a home that scores zero is a home that is a net zero user of energy (see [www.resnet.us](http://www.resnet.us) for more details). Homes that meet the Builders Challenge qualifications score 70 or less on the scale (or are 30percent more efficient than a typical new home). Homes that meet ENERGY STAR qualifications score 85 or less on the scale (or are 15percent more efficient than a typical new home). Both programs intend to increase the stringency of their requirements in the coming months.



To enforce requirements for state-funded buildings, the OA's Facilities Management, Design and Construction division refers to construction inspectors located across the state. As there currently is no ongoing state construction activity, these individuals manage maintenance and repairs for existing state buildings.

The number of visual inspections for any new structure varies widely, ranging from a total of three to twenty-six. Those areas with fewer inspections do not conduct insulation or other energy inspection.

Enforcement is conducted by the cities, towns, and counties that have adopted an energy code. Building inspections typically follow a standard procedure: building professionals submit their plans to plans examiners, who return them with comments. Architects then re-submit plans with corrections, and plan examiners issue building permits once they are adequate. Code officials then conduct multiple on-site inspections at different stages in the building process (foundation, frame, electrical, plumbing, final), issuing inspection write-ups or stop-work orders for violations as needed (very rarely or never for energy related issues). After code officials have verified that construction correctly adheres to the building plans, they issue the appropriate final documentation, depending on the type of building and project. Most jurisdictions interviewed for this report do not require the use of REScheck and COMcheck.<sup>xvi</sup>

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#### BARRIERS ACCORDING TO ENFORCEMENT OFFICIALS:

**Lack of priority.** In most jurisdictions, the energy code is a newer consideration, and many policymakers and code officials view it as a secondary concern compared to the more traditional health and safety codes. In addition, their major concern is encouraging growth in their cities, so when pressured by designers, builders, or new businesses moving into their city, officials may concede energy code enforcement in order to attract new developments or industry. Building officials that do not value the energy code as integral to occupant health and safety are less likely to integrate the code into their established routines, particularly if their superiors do not value energy codes. As one code official said: *"Nobody wants to enforce more than they have to. And there's resistance to things that aren't considered health and safety – things that are needed – [like] structural, fire [codes] they understand."* Funding for proper energy code enforcement ultimately comes from city council members and other local decision makers, many of whom lack the conviction to support implementation.

For communities that have adopted an energy code, enforcement may be weak or entirely nonexistent. Either the local code official does not enforce the energy code at all or they visually inspect only one aspect of the code, such as attic insulation. Some communities integrate energy codes inspections into other inspections (e.g., Kansas City). This can be an extremely effective way to leverage small inspection staff and limited budgets.

In sum, the majority of jurisdictions interviewed for this report said that either they did not conduct a special "energy" inspection or that they did not inspect for the energy code at all.

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<sup>xvi</sup> REScheck is a software tool developed by the U.S. Department of Energy to simplify and clarify code compliance with the 2009 IECC energy code. COMcheck is the correlating commercial code compliance tool. Both are required by the DOE for those state receiving stimulus funding for advancing energy code efforts.



**A lack of resources for energy code enforcement.** Local inspection departments collect building permit fees, but these fees often do not fully offset the cost of code enforcement. The majority of local building departments are understaffed and overworked, and, for some, the burden of supporting the energy code is one of many code they are responsible for inspecting. Many others understand the crucial role energy codes play in improving the efficiency, health, and safety of buildings and occupants, but lack the resources and time required to grant the energy code equal status and the same attention as other codes. These issues also apply to members of the building industry, who often lack the training and financial incentives that would motivate them to build to code. In Columbia, for example, code inspectors have been lost in the economic downturn; the city currently have 3 inspectors and 4 permit technicians to manage 400 permits issued annually. Said one code official: “we’re a profit center for the city, but our fees go to the general fund and we’re reallocated a small portion.”

**Lack of familiarity.** Familiarity with energy code provisions varies greatly between code officials in the state. Most code enforcement professionals interviewed for this report understand the importance of energy codes. However, trained to enforce traditional health and safety codes, most code officials have not had formal education in building science, energy codes, or proper energy code implementation. The vast majority of inspectors come from the design and building sectors. They tend to focus on the areas of construction with which they are the most familiar. Since few, if any, come from an energy efficiency background, they lack experience with the provisions and enforcement of the code. In addition, new provisions in the 2009 IECC require performance testing equipment, such as blower doors and duct testing equipment, with which most code officials and builders are largely unfamiliar.

**Distance between jurisdictions.** With the majority of the population located in the Kansas City and St. Louis metro areas along the I-70 corridor, as well as the growing region from Columbia to Springfield, the central part of the state naturally has more exposure than the rural areas to the information, techniques, and tools needed. For code officials who live outside of this region in Missouri, the distance and travel expenses limit access to training and information exchanges.

**Gap #12: Building departments in many areas of the state lack the resources to enforce codes.**

## TRAINING AND CONTINUING EDUCATION CREDITS FOR ENFORCEMENT PROFESSIONALS

Local building departments determine their own certification requirements for code inspectors, the process for enforcement of codes, the schedules of permit fees<sup>xvii</sup>, and other details. Some local jurisdictions require or encourage their enforcement professionals to maintain up-to-date certification through the ICC. As one code official said: “it’s not mandatory, but it looks good to city council to have competent people.” For example, in Creve Coeur, while it is not a city mandate, four of the five building officials are certified through the ICC (and the fifth is working on certification now); and they must obtain 45 hours of CEUs every three years.

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<sup>xvii</sup> Typically, the cost for energy code enforcement is rolled into the regular permit fee, which is based on the cost of the project. For failed inspections, some jurisdictions charge a small fee for re-inspection but many do not.



**Gap #13: Building departments often lack expertise in the energy code and are often not required to obtain training or certification.**

## BEST PRACTICES

Some jurisdictions have adopted recent energy codes, and have thoughtfully designed well-rounded programs to encourage and incentivize more energy efficient building construction in their communities. Listed below are some of these best practices:

### STATE-BASED

- Via Executive Order (09-18), state agencies are exceeding the goal of reducing energy consumption in state buildings by more than 2 percent annually.<sup>68</sup>
- The DNR's *Missouri Energy Revolving Fund Loan Program* has invested more than \$80 million in energy efficiency for public buildings, and saved the state at least \$146 million so far in reduced energy bills.
- The DNR offers a list of certified energy raters online for builders and code officials so that they can subcontract inspections to third-parties out as needed.
- Marshall Missouri and Jackson County adopted the 2009 IECC without amendment.

### KANSAS CITY

- Is saving \$2 million in annual energy costs due to energy efficiency retrofits throughout jurisdictional buildings.
- Enacted a Green Building Ordinance requiring that new city-funded construction and renovation of more than 5,000 square feet must earn LEED Silver certification.<sup>69</sup>
- Passed a *Climate Protection Plan*<sup>70</sup> in July 2008 with the help of several city-organized working groups<sup>xviii</sup>. It includes 55 GHG reduction measures, including a goal to “better understand the impact of buildings (including residential, commercial, institutional, industrial, and governmental) on GHG emissions and create policies and action plans that comprehensively reduce the impact of current and future building stock on GHG emissions.”<sup>71</sup> Additionally, it recognized the need for a broad-based education and outreach effort, as well as the adoption of stronger energy efficiency standards in the city's building code.<sup>72</sup>
- Maintains a “Sustainability Officer” position in city government, which oversees sustainability and climate action plans, develops criteria, policies, and procedures for sustainable programs, and monitors utility usage data and GHG emissions of the city government and the community.
- Adopted an ordinance requiring housing projects funded by the city (including affordable housing) to be constructed to meet federal ENERGY STAR qualifications.<sup>73</sup>

<sup>xviii</sup> The work groups included: Carbon Offsets and Waste Management, Energy, Policy and Outreach Working Group, Transportation, Buildings and Infrastructure, Green Buildings Subgroup, Renewable Energy Subgroup, “No Waste” Subgroup, and Land Use and Development Subgroup.



- Passed an Economic Development and Incentives Policy to promote sustainability and green building in construction projects receiving financial support from the city.
- Mayor created an Environmental Management Commission (EMC) to promote and create policies that address sustainability and climate change, including a climate plan. The Climate Protection Plan Steering Committee now supports and the plan.<sup>74</sup>
- The Greater Kansas City Chamber of Commerce created the “Greater Kansas City Climate Protection Partnership” to form a coalition of area employers working together to improve air quality in the region. This type of community outreach educates and familiarizes the general population, and it may ultimately increase citizen support for energy efficiency. Such leadership in the greater Kansas City region can influence about 125 towns and cities and nine counties.

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## CITY OF COLUMBIA

- Established two major local commissions: (1) A Building Codes Commission (BCCC) mainly composed of architects, engineers, contractors; and (2) an Environment and Energy Commission. Both would be comprised of knowledgeable citizens that assist the city in providing important insights into the impacts of adopting an energy code, and also help establish good community politics by involving local community leaders in the issue.
- Performs energy assessments on city-owned facilities and improves buildings based on resulting recommendations.<sup>75</sup>
- City staff has trained more than 50 building operators on energy efficiency. The estimated energy savings as a result of trained personnel is about 5,676,000 kWh annually. One industry garnered \$20,000 in savings after the first year.<sup>76</sup>
- Requires that “open wall” inspection be included as one of five main inspections (Footing/Depth, Open Wall (insulation), Framing, Plumbing, Electrical), allowing inspectors to visually inspect wall insulation.
- “Leads by example” as its city hall and two fire stations meet LEED system certifications. Further, city tracks energy usage data and highlights the savings to exemplify fiscal responsibility to the community.
- Established an Office of Sustainability, funded via the EECBG program<sup>xix</sup>, and employs a Sustainability Manager, who helps further advance energy codes by educating the public and construction professionals on the importance of energy efficiency.

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## CITY OF CLAYTON

- Passed a Municipal Building Standard in 2006 that requires new construction and major renovations of city-owned, occupied, or funded buildings over 5,000 ft<sup>2</sup> to attain LEED Silver certification.

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<sup>xix</sup>The EECBG Program, funded by the American Recovery and Reinvestment Act of 2009, represents a Presidential priority to deploy the cheapest, cleanest, and most reliable energy technologies available—energy efficiency and conservation—across the country. The Program was authorized in Title V, Subtitle E of the Energy Independence and Security Act (EISA) and signed into law on December 19, 2007. It is intended to assist U.S. cities, counties, states, territories, and Indian tribes to develop, promote, implement, and manage energy efficiency and conservation projects and programs designed to: reduce fossil fuel emissions, reduce the total energy use of the eligible entities, improve energy efficiency in the transportation, building, and other appropriate sectors, and create and retain jobs.



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## CITY OF SPRINGFIELD

- In Springfield, Kansas City, and Columbia, code inspectors use energy code inspection checklists.
- Passed a Green Building Policy in 2008 that requires renovations of city-owned buildings to incorporate the LEED for Existing Buildings rating system to the greatest extent possible. The Policy also mandates the use of ENERGY STAR appliances wherever possible.
- Modified the Multiple Listing Service (MLS) to include a field identifying ENERGY STAR-rated homes. Realtors will now be able to track whether ENERGY STAR homes sell faster and/or at a higher price and can use this information when marketing homes for sale to buyers.

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## CITY OF SAINT LOUIS

- Has tied pay raises for their code enforcement personnel to ICC certification, encouraging staff to expand the breadth and depth of their code knowledge.



## RECOMMENDATIONS FOR IMPROVEMENT

Positive change toward energy code adoptions and enforcements will take efforts from numerous sources – state agencies can encourage and facilitate meetings, provide resources, assistance, and recognition for leading jurisdictions; stakeholders can come together to advocate for policies that would provide needed funding for energy code training and resources; and local jurisdictions can partner with stakeholders and regional, county, and municipal organizations to provide education, awareness campaigns, and outreach to their communities. The following represent many opportunities Missouri stakeholders, local jurisdictions, and the state could engage when given the opportunity.

**Gap #1: Due to its tradition of strong local governments, Missouri has not adopted a statewide energy code. The state reflects a patchwork of different codes that lack consistency among jurisdictions.**

**Recommendation:** This report recommends that stakeholders consider the adoption of a statewide energy code. For the purposes of providing immediate recommendations, this report will focus on progress that can be made by assisting local jurisdictions.

**Gap #2: To date, many local jurisdictions in Missouri have not yet adopted an energy code.**

**Recommendation:** In order to “move the market”, designated state agencies, including DNR, can dedicate time and resources to encouraging and supporting local jurisdictions to adopt codes. Top recommendations include statewide education workshops, training, and others detailed below.

**Gap #3: Because a large share of counties are not authorized to adopt building codes, many unincorporated, rural areas of the state are unable to adopt an energy code.**

**Recommendation:** The state legislature could change the permitted authority of Class 3 counties to allow them to adopt energy codes if they choose to.

**Gap #4: Despite the familiarity of many code officials, there is a lack of information regarding the energy code at the local level. In particular, local governments would benefit from additional resources regarding code compliance.**

**Recommendation A:** State agencies, including DNR, could consider developing a system to provide energy code assistance for contractors, architects, engineers and other construction personnel in order to: (1) provide one consistent perspective and source of information on codes interpretations (rather than risking misinformation which may come from various sources); and (2) continue to build a positive relationship with the construction industry. As well, the state agencies could conduct outreach statewide to let builders know about new informational resources. Stakeholder contact information collected during the production of this report will be provided to DNR for this effort. In addition, the state agencies can make code officials aware of the availability of the free online version of the IECC.

**Recommendation B:** The DNR could build up their website to include additional information on the energy code and local best practices. Additionally, the state could provide a calendar of educational events and



market it to stakeholders. Links could be provided to other code resource websites (Energycodes.gov, bcap-ocean.org, iccsafe.org, and others).

**Recommendation C:** Code officials could be encouraged to attend a Building America training course to enhance their understanding of building science and the importance of proper installations of insulation, air sealing, and other energy features. Given the opportunity, the state could provide an incentive for full participation by all code officials statewide in the form of (1) making the course free to building officials; (2) maximizing the CEU credits earned by professionals; (3) providing free breakfast and lunch.

**Recommendation D:** In order to support code enforcement personnel who are in the position of educating various stakeholders about energy codes, the state could continue to provide and distribute ready-made information tailored for certain audiences (see below). Information could emphasize the potential money saved by lower energy bills in order to boost the market demand for energy efficient products and services. Materials could be designed so that local building departments can add their own logo and distribute locally. Code personnel and builders interviewed for this report said that these ready-made materials would be particularly helpful:

- **For use by code enforcement personnel:** A field inspection checklist for code inspectors;
- **For designers:** A form/checklist of each specific energy measure required to be included in building plans. Code departments could require that this form be returned from permit applicants with each item checked, and the form signed by the design professional, assuring that the plans meet energy code requirements.
- **For consumers:** Marketing materials about the importance and benefits of energy codes, especially the estimated cost and expected payback period/return via lower energy bills.
- **For policy-makers:** Concise information about the benefits of energy codes as a policy goal. Information could include the cost and expected payback period for buyers; how energy codes help boost a state's economy by reducing the amount of money sent out of state (or abroad) for imported energy; that jobs are created as the demand for energy-efficient services and products increases.
- **For lenders:** The state can play a leading role working with and educating lenders by providing them with information demonstrating how energy efficient homes save home owners money every month—and therefore lower default risk. If successfully implemented, banks could qualify borrowers for higher loan amounts reflecting anticipated energy savings. This approach could eliminate the claim that energy efficient homes (with their slightly higher sales prices) discomfit some would-be buyers.

**Recommendation E:** In order to provide local jurisdictions with compliance assistance, the state could review DOE's new guidelines on measuring energy code compliance and disseminate this information to local jurisdictions with suggestions for how to adopt DOE's recommendations given the realities on the ground.<sup>77</sup>

**Gap #5: There is a lack of public demand for energy efficiency in buildings.**



**Recommendation A:** This analysis recommends engaging contractors, architects, and other LEED-certified (or similar) professionals in the promotion of energy efficiency, by providing them with energy code marketing materials that describe the compelling and specific benefits of energy efficiency.

**Recommendation B:** Public demand for energy efficiency in housing can be raised through courses on energy efficiency via partnerships with groups that reach more rural areas of the state. Partnerships could be formed with organizations including, but not limited to, the State Extension Service, regional planning commissions, and home builder associations. The State Extension Service may be an especially good candidate for partnership since they have a history and expertise in offering courses to the public, including energy efficiency courses.

**Recommendation C:** Subject to available funding, the state could educate the general public and construction industry professionals with a “Show Me How” energy efficient housing demonstration project. The state could partner with museums and HBA to build small demonstration homes at local museums to demonstrate the latest technology in energy efficiency. For example, the state could partner with the St. Louis HBA (and local funders) to construct a zero-energy home at the St. Louis Science Center. Since energy efficiency is largely “out of sight, out of mind” for many consumers, such demonstration projects would allow the general public to see, touch, and learn about the best technology on the market, helping to drive energy efficient construction and the Missouri housing market toward the latest building practices. An example of such a project is being done now with the PNC Financial Corporation’s Smart Home in [Cleveland, Ohio](#).<sup>xx</sup>

**Recommendation D:** Builders who are going the extra mile could be recognized for new buildings or homes built to higher standards and therefore, granted a competitive edge. Opportunities include awards, press releases, and online acknowledgement for builders who meet the Builders Challenge qualifications.

**Recommendation E:** In the longer term, if funds are available, the state could launch a campaign around energy efficiency, including public relations efforts and media radio and TV interviews, news releases, and articles with the intention of raising public awareness on the benefits of energy efficiency.

**Gap #6: There is a lack of political support at the local government level to “champion” energy codes. BCAP has found that areas that have a local champion (whether a member of a building department or a political figure) are much more successful in implementing the energy code.**

**Recommendation A:** Local governments and existing champions that are leading by example for more stringent codes for city-owned buildings than what is required of the private sector (such as in St. Louis and Clayton where city-owned buildings must meet LEED rating system criteria) could be publicly acknowledged. These efforts familiarize and train the construction industry and code enforcement officials by exposing them to new building practices and products.

Mayors associations, regional planning commissions, the Municipal League, and similar groups can help to raise the awareness of local government leaders on what other municipalities within Missouri are doing to take a leadership role in energy efficiency. Key messages could include the potential of energy codes and

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<sup>xx</sup> For more information, go to <http://www.cmnh.org/site/AtTheMuseum/OnExhibit/SmartHome.aspx>



related policies that allow local governments to demonstrate fiscal responsibility for taxpayer dollars, stimulate jobs, and save people (and governments) money through lower bills. The local governments that received EECBG funding could be contacted to determine what efforts they have made to increase energy code or energy awareness in their communities. Awards, news releases, and other publicity could be given to those that have recently completed an energy efficient upgrade to an existing building; completed a LEED-certified new building; a zero energy home; or related efforts.

**Recommendation B:** Encourage excellence in construction practices at the local level by promoting best practices to local building departments. These building departments can take on the following steps:

- Expedite the permitting process for builders who build to Builders Challenge or ENERGY STAR (or equivalent).
- Reduce permit fees for buildings that are LEED (or equivalent) certified, ENERGY STAR or Building America qualified.
- Accept the Builders Challenge qualifications or ENERGY STAR certification in place of the traditional energy code compliance path. (Jurisdictions should require that both the builder and HERS rater be registered with Building America or ENERGY STAR programs to participate).
- See the “Best Practices” section of this report for additional opportunities.

**Recommendation C:** This analysis suggests creating and engaging “Energy Code Ambassadors” whereby key regional building code officials would advocate for energy codes and mentor local building departments as they transition to new, more stringent energy codes.<sup>xxi</sup>

**Recommendation D:** The state could encourage communities to designate or hire a Community Energy Efficiency Manager (CEEM). A CEEM promotes energy saving projects within a community and helps a town build capacity by transferring knowledge to inspectors, key officials and residents, and creating a knowledge base to empower local communities. Although a rural region may not currently have the ability to act on its own, a CEEM can help a town or region become self-sufficient and pro-active. The CEEM may be employed temporarily – to the point at which a municipality has a solid understanding of the benefits of energy efficiency.

**GAP #7: While possessing numerous state actions in the realm of energy conservation, Missouri lacks legislation or rules that could provide enduring funding to expanded energy code efforts at the state level.**

**Recommendation:** Missouri needs coalitions of stakeholders to examine potential policies and programs that can provide funding for state-led code-related work meant to support local jurisdictions. The state could assist in bringing stakeholders together to consider potential sources of funding for training, education, and other programs. For example, this coalition could consider whether utility (ratepayer) funded energy efficiency programs offered by investor owned utilities (IOUs) could support energy code-related activities.

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<sup>xxi</sup> For more information, see BCAP website <http://bcap-ocean.org/news/2010/september/21/energy-code-ambassadors-update-idaho-illinois-and-more>



Specifically, whether such activities by regulated electric IOUs would be appropriate under the Missouri Energy Efficiency Investment Act (MEEIA), which authorizes performance incentive<sup>xxii</sup> for successful achievements associated with implementing energy efficiency programs.

**Gap #8: There is a lack of education on energy efficient building in the construction industry.**

**Recommendation:** When funds are available, state agencies and other stakeholders can overcome the knowledge barrier in energy code compliance by offering education to building industry trades professionals.<sup>xxiii</sup> Partnerships between state agencies and an existing non-governmental organization (such as the state HBAs) could help generate interest and participation. State agencies can also adopt the following ideas:

- Hosting local Building America courses (DOE program), which teach builders various approaches to constructing the best homes possible. The cost is \$6,500 per one-day course, (this includes *all* costs, including marketing to builders in your state, and continuing education credits for builders). There are two course options available: *“Houses that Work”* for new homes and *“Remodeling for Energy Efficiency”* for existing homes. The registration fee for builders is about \$125 per person. To schedule, call Nancy Bakeman at The Energy and Environmental Building Alliance at (952) 881-1098 or [nancy@eeba.org](mailto:nancy@eeba.org).
- Encouraging builders to attend a Building America-sponsored training.<sup>78</sup> Attendees receive CEU credits for various programs, including (e.g., AIA, NAHB), plus additional benefits offered through EEBA.
- Offering a 50% subsidy to builders, architects, or other building professionals to attend out-of-state training.
- Organizing free energy code training workshops regionally throughout Missouri, including CEU credits.

**Gap #9: At present, there is not a method in place to measure and evaluate compliance with the energy code. It should be noted that this is likely to change in response to forthcoming ARRA-mandated compliance measurement efforts now being considered.**

**Recommendation:** To demonstrate the 90 percent compliance rate, an onsite audit of buildings based on a statistically valid sample of buildings across jurisdictions in the state is necessary.<sup>xxiv</sup> The state can review DOE’s guidance on measuring energy code compliance and disseminate this information to local jurisdictions with suggestions for how to adopt DOE’s recommendations given the realities on the ground in particular communities or develop an evaluation methodology.<sup>xxv</sup>

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<sup>xxii</sup> A performance incentive allows IOUs to profit from successful energy efficiency programs, rather than merely break-even, making energy efficiency programs a better business venture for IOUs.

<sup>xxiii</sup> Educational courses should be marketed to builders in such a way that they see a benefit to taking time off to attend, and for paying their subcontractors a day’s salary to attend. Therefore, they must be marketed to clearly communicate the marketing benefits and financial gain to the builder for building energy efficient homes.

<sup>xxiv</sup> The U.S. Department of Energy offers information on this effort:

[http://www.energycodes.gov/arra/compliance\\_evaluation.stm](http://www.energycodes.gov/arra/compliance_evaluation.stm).

<sup>xxv</sup> See <http://www.energycodes.gov/arra/documents/MeasuringStateCompliance.pdf>.



**Gap #10: Builders are not required to be licensed or certified at the state level nor obtain continuing education credits. While required by some local governments, there are currently no statewide requirements for energy code training, certification, or CEUs for building trades professionals. It should be noted that many local governments do call for some of these requirements.**

**Recommendation A:** In addition to exploring statewide licensure, relevant state agencies could work with HBAs to engage them in encouraging their members to attend energy efficiency and building courses. HBA could help organize such classes. The state could provide incentives for builders to attend classes.

**Recommendation B:** Within state government, the opportunity exists within appropriate bodies of professional regulation to adopt new requirements for energy code training for key trades (such as architects and engineers) as part of the CEU requirements for license renewal.

**Recommendation C:** This report suggests reaching out to AIA to seek their support in encouraging their architect members to attend energy code or Building America training. For example, they may be willing to increase the CEU credits for attendance at an ICC energy code course, or require it as part of their CEU requirements.

**Gap #11: The use of third party, above-code energy efficiency programs at the local level is limited and could be expanded.**

**Recommendation:** For residential buildings, local jurisdictions could be encouraged to utilize third-party certification programs such as ENERGY STAR, LEED for homes, or Building America (EnergySmart).

**Gap #12: Building departments in many areas of the state lack the resources to enforce codes.**

**Recommendation A:** Local jurisdictions would benefit from the provision of simplified recommendations and resources on best practices to help building departments quickly get up to speed on the best ways to enforce the energy code. Examples include an energy checklist, REScheck, or COMcheck at the time of permit application; ICC training for code personnel; charging fees for energy inspections, re-inspections, and repeated reviews; accepting a HERS rating in place of traditional energy code inspection (this passes the cost and expertise of inspection from the building department to the builder).

**Recommendation B:** By expanding the technical capabilities, the state (perhaps in the OA Facilities Management, Design and Construction division) could offer plan reviewers in local jurisdictions design assistance for complex plans.

**Recommendation C:** State building departments could subsidize the use of blower door and duct blaster equipment to facilitate building inspections or make equipment available for rental by jurisdictions so that it can be shared between multiple cities.

**Recommendation D:** The state could continue to update the Missouri certified energy rater list and make it available online for builders and code officials so that they can subcontract inspections to third-parties.



**Recommendation E:** Building departments could explore changes to fee structure to offset the cost of energy code inspections.<sup>xxvi</sup>

**Gap #13: Building inspections departments often lack expertise in energy codes and are not required to obtain training or certification.**

**Recommendation:** Building department inspectors could be encouraged to seek education and training in energy codes and be required (at the local level) to pass ICC certification tests.

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<sup>xxvi</sup> A model and precedent for such a fee exists in the state in the form of the boiler code inspection process.



## ACKNOWLEDGMENTS

We would like to acknowledge the financial support of the Missouri Department of Natural Resources, which made this report possible.

**State officials** also collaborated in the production of this report, providing comprehensive background information, local stakeholder's contacts, and ongoing review of our work. In particular, we would like to acknowledge the aid of Brenda Wilbers, Andy Popp, Steve Busch, David Harrison, Bernard Thompson, and James Trout at the **Missouri DNR's Division of Energy**; Cathy Brown and Tom Schmidt at the **Missouri Office of Administration's Division of Facilities Management, Design and Construction**; Judy Kempker at the **Missouri Division of Professional Registration**; and Gary Scribner at the **Department of Public Safety, Division of Fire Safety**; and John Rogers at the **Public Service Commission**.

**We appreciate the insights provided by representatives of the Missouri Association of Building Officials and Inspectors (MABOI):** Bryan Kopp (Building Official in Des Peres), Jared Agee (Building Commissioner/Deputy Director in University City), Sally McGowan (Inspector in Saint Louis County), and Patrick Burke (Commercial Building Inspector in the City of Creve Coeur); and Johnny Benisch at the **Missouri Association of Code Enforcement**; Trey Lambertz, President of the **Missouri Association of Building and Fire Officials**; Roger Kroh and Georgia Nesselrode at the **Mid-America Regional Council**; Maryellen Brennen at the **Missouri Association of Counties**; and Richard Sheets at the **Missouri Municipal League**; Barbara Buffaloe in Columbia; .

**We appreciate the contributions of time and insights provided by these code enforcement personnel:** Tony Carvalho in Kirkwood; Travis Bickings and Mike Conrad in Cape Girardeau; Aaron Owens in Poplar Bluff; Dustin Harrison in West Plains; Larry Murry in Excelsior Springs; Brad Selby in Kirksville; Chris Straw in Springfield; Patrick Burke in Creve Coeur; David Kasl in St. Louis County; Gerry Shechter in Kansas City; Kristi Bales in Jefferson County; Greg Tate in the city of St. Charles; Jeff Holman in Clycomo; Gary Crabtree in Fenton; Doug Kinney in Columbia; Greg Franzen in Kansas City; Nick Workman and Scott Karr in Grandview; David Lehman in Independence; Jim Penney in Columbia; Christopher Schlumm, Ronald A. Brendel, and Ed Ware in the city of St. Louis; Steve Unser in Creve Coeur; Marlon Southard in Jackson County; Mike Morgan in Marshall; Nathan Lacey in O'Fallon;

**These builders provided critical insights and information for the report:** Patrick Sullivan and Emily Wineland at the St. Louis HBA; Matt Morrow and Jennifer McClure at the HBA of Greater Springfield; Matt Belcher at Belcher Homes; and Timothy Martin at McKelvey Homes. We also thank **AIA Kansas City** representatives Tiffany Shepherd and Dawn Taylor; realtor Zach Miller in Springfield; and USGBC's Emily Andrews.



## APPENDIX A

The U.S. Department of Energy provides a number of useful resources that can assist states and local governments in their efforts to achieve code compliance. Many of these resources are available at [www.energycodes.gov](http://www.energycodes.gov). Materials include training presentations and background on DOE-sponsored software programs, REScheck and COMcheck, which evaluate compliance for residential and commercial buildings, respectively. These software programs, which present prescriptive code requirements and calculate compliance tradeoffs, simplify the process of evaluating a building's code compliance. By explaining requirements, these software programs can help designers, builders, and code officials streamline efforts to achieve code compliance.

### Resource Guides for Code Officials

1. ICC/DOE BECP Resource Guide for Code Officials: a comprehensive and easy to read collection of the best resources available from ICC and DOE.  
<http://www.energycodes.gov/publications/resourceguides/>

### Energy Code Compliance Training Materials:

1. Commercial PowerPoint Training with links to videos  
[http://www.energycodes.gov/becu/documents/Commercial\\_90\\_Percent\\_Eval\\_Inspect\\_Training.pdf](http://www.energycodes.gov/becu/documents/Commercial_90_Percent_Eval_Inspect_Training.pdf)
2. Residential PowerPoint Training with links to videos  
[http://www.energycodes.gov/becu/documents/Residential\\_90\\_Percent\\_Eval\\_Inspect\\_Training.pdf](http://www.energycodes.gov/becu/documents/Residential_90_Percent_Eval_Inspect_Training.pdf)
3. DOE Guidance for State Compliance Measurement Efforts  
<http://www.energycodes.gov/arra/documents/MeasuringStateCompliance.pdf>

### Primer on REScheck and COMcheck

1. Commercial Compliance <http://www.energycodes.gov/comcheck/>
2. Residential Compliance <http://www.energycodes.gov/rescheck/>

### Available Downloads

1. Commercial Basic Requirements Download <http://www.energycodes.gov/comcheck/download.stm>
2. Residential Basic Requirements Download <http://www.energycodes.gov/rescheck/download.stm>

### Users Guides

1. COMcheck Software Guide  
[http://www.energycodes.gov/comcheck/documents/com\\_software\\_users\\_guide\\_2004\\_2006\\_and\\_2009\\_IECC.pdf](http://www.energycodes.gov/comcheck/documents/com_software_users_guide_2004_2006_and_2009_IECC.pdf)
2. REScheck Software Guide  
[http://www.energycodes.gov/rescheck/documents/rescheck\\_users\\_guide\\_1008.pdf](http://www.energycodes.gov/rescheck/documents/rescheck_users_guide_1008.pdf)

### Plan Check and Field Inspection

1. Commercial Plan Review Quick Reference Guide  
[http://www.energycodes.gov/training/pdfs/comm\\_review\\_guide1.pdf](http://www.energycodes.gov/training/pdfs/comm_review_guide1.pdf)
2. Residential Plan Review Quick Reference Guide  
[http://www.energycodes.gov/rescheck/documents/res\\_review\\_guide.pdf](http://www.energycodes.gov/rescheck/documents/res_review_guide.pdf)

### Code Notes

<http://www.energycodes.gov/help/notes.stm>



## REFERENCES

- <sup>1</sup> <http://www.aceee.org/policy-brief/advanced-building-energy-codes>
- <sup>2</sup> Energy Information Administration webpage “Missouri – State Energy Data System”, accessed May 2, 2011 from [http://www.eia.gov/emeu/states/hf.jsp?incfile=sep\\_prices/total/pr\\_tot\\_mo.html&mstate=MISSOURI](http://www.eia.gov/emeu/states/hf.jsp?incfile=sep_prices/total/pr_tot_mo.html&mstate=MISSOURI); and EIA webpage accessed May 2, 2011 from [http://www.eia.doe.gov/emeu/states/sep\\_sum/html/pdf/sum\\_ex\\_tot.pdf](http://www.eia.doe.gov/emeu/states/sep_sum/html/pdf/sum_ex_tot.pdf); and Missouri Governor Jay Nixon’s News Release July 13, 2009, accessed May 17, 2011 from [http://governor.mo.gov/newsroom/2009/Energy\\_Efficient\\_Investment\\_Act](http://governor.mo.gov/newsroom/2009/Energy_Efficient_Investment_Act).
- <sup>3</sup> U.S. Federal Facilities Council. Sustainable Federal Facilities: A Guide to Integrating Value Engineering, Life Cycle Costing, and Sustainable Development. Federal Facilities Technical Report No 142. 2001. National Academy Press. Washington, DC. 2001. For more information <http://sites.nationalacademies.org/DEPS/FFC/index.htm>
- <sup>4</sup> U.S. Department of Energy, 2008 Buildings Energy Data Book, page 69.
- <sup>5</sup> BCAP. <http://bcap-ocean.org/news/2011/march/30/arkansas-governor-approves-bill-authorizing-energy-office-update-energy-code>
- <sup>6</sup> BECP. “Code Development Determinations.” <http://www.energycodes.gov/codedevelop/determinations.stm>
- <sup>7</sup> BCAP. <http://bcap-ocean.org/energy-policy-act-epact-compliance-commercial>
- <sup>8</sup> BCAP. <http://bcap-ocean.org/energy-policy-act-epact-compliance-residential>
- <sup>9</sup> BCAP. <http://bcap-ocean.org/news/2010/sepember/08/doe-issues-preliminary-determination-2009-iecc-residential-energy-savings>
- <sup>10</sup> American Recovery and Reinvestment Act, Section 410. pp.32-34. [http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=111\\_cong\\_bills&docid=f:h1enr.pdf](http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=111_cong_bills&docid=f:h1enr.pdf)
- <sup>11</sup> DOE. Gov. Jay Nixon Letter to Secretary Chu. March 23, 2009. [http://www.energy.gov/media/Nixon\\_Missouri.pdf](http://www.energy.gov/media/Nixon_Missouri.pdf)
- <sup>12</sup> Missouri Department of Natural Resources, Missouri Resources, Winter 2011, Volume 28, Number 1. page 10-11. Accessed June 2 from [www.dnr.mo.gov/magazine/2011-winter.pdf](http://www.dnr.mo.gov/magazine/2011-winter.pdf)
- <sup>13</sup> <http://quickfacts.census.gov/qfd/states/29000.html>
- <sup>14</sup> Census Bureau webpage “State and County Quickfacts: Missouri: Accessed May 11, 2011 from <http://quickfacts.census.gov/qfd/states/29000.html>. Info in text box is from Missouri Department of Natural Resources, webpage *Missouri Fossil Fuel Use At A Glance*. Accessed May 17, 2011 from <http://www.dnr.mo.gov/energy/utilities/eia-fossilfuel.htm>.
- <sup>15</sup> Energy Information Administration, web page “Missouri Electricity Profile:”, accessed May 2, 2011 from [http://www.eia.gov/cneaf/electricity/st\\_profiles/missouri.html](http://www.eia.gov/cneaf/electricity/st_profiles/missouri.html)
- <sup>16</sup> Energy Information Administration webpage “Missouri – State Energy Data System”, accessed May 2, 2011 from [http://www.eia.gov/emeu/states/hf.jsp?incfile=sep\\_prices/total/pr\\_tot\\_mo.html&mstate=MISSOURI](http://www.eia.gov/emeu/states/hf.jsp?incfile=sep_prices/total/pr_tot_mo.html&mstate=MISSOURI) and Missouri Governor Jay Nixon’s News Release July 13, 2009, accessed May 17, 2011 from [http://governor.mo.gov/newsroom/2009/Energy\\_Efficient\\_Investment\\_Act](http://governor.mo.gov/newsroom/2009/Energy_Efficient_Investment_Act)
- <sup>17</sup> Mid America Regional Council. Roger Kroh and Georgia Nesselrode. Direct communication to John Miller May 2011.
- <sup>18</sup> EIA, Residential Energy Prices
- <sup>19</sup> US Census Bureau New Housing Starts.
- <sup>20</sup> Includes coal, natural gas, crude oil, nuclear, renewable energy (biofuels and other).
- <sup>21</sup> <http://www.eia.doe.gov/state/state-energy-rankings.cfm?keyid=89&orderid=1>
- <sup>22</sup> <http://www.eia.doe.gov/state/state-energy-profiles-data.cfm?sid=MO#undefined>
- <sup>23</sup> Energy Information Administration webpage “Missouri – State Energy Data System”, accessed May 2, 2011 from [http://www.eia.gov/emeu/states/hf.jsp?incfile=sep\\_prices/total/pr\\_tot\\_mo.html&mstate=MISSOURI](http://www.eia.gov/emeu/states/hf.jsp?incfile=sep_prices/total/pr_tot_mo.html&mstate=MISSOURI)
- <sup>24</sup> [http://www.eia.gov/cneaf/electricity/epm/epmxmlfile1\\_6\\_a.xls](http://www.eia.gov/cneaf/electricity/epm/epmxmlfile1_6_a.xls)
- <sup>25</sup> <http://www.eia.doe.gov/state/state-energy-profiles-analysis.cfm?sid=MO>
- <sup>26</sup> <http://www.eia.doe.gov/state/state-energy-profiles-analysis.cfm?sid=MO>
- <sup>27</sup> <http://www.eia.doe.gov/state/state-energy-rankings.cfm?keyid=60&orderid=1>
- <sup>28</sup> <http://www.eia.doe.gov/state/state-energy-profiles-data.cfm?sid=MO#undefined>
- <sup>29</sup> <http://www.eia.doe.gov/state/state-energy-profiles-analysis.cfm?sid=MO>



- 
- <sup>35</sup> ICLEI Global. About ICLEI. <http://www.iclei.org/index.php?id=about>
- <sup>36</sup> U.S. Conference of Mayors Climate Protection Agreement. <http://www.usmayors.org/climateprotection/agreement.htm>
- <sup>37</sup> Sierra Club. About Cool Cities. <http://www.coolcities.us/about.php?sid=7db9575f59f4841a49bc8c9b8e6415e0>
- <sup>38</sup> Southeast Missouri Climate Protection Initiative. Purpose. [http://cstl.semo.edu/semocpi/Climate\\_Change\\_Information/purpose.htm](http://cstl.semo.edu/semocpi/Climate_Change_Information/purpose.htm)
- <sup>39</sup> Southeast Missouri Climate Protection Initiative. <http://cstl.semo.edu/semocpi/index.htm>
- <sup>40</sup> Southern Baptist Declaration on the Environment and Climate Change. <http://www.baptistcreationcare.org/node/1>
- <sup>41</sup> The *Baptist Faith and Message* is a faith statement adopted by the Southern Baptist Convention in June 14<sup>th</sup>, 2000.
- <sup>42</sup> Ibid.
- <sup>43</sup> Ibid.
- <sup>44</sup> Missouri Association of Counties, Mission Statement page, accessed May 3, 2011 from <http://www.mocounties.com/about.htm>
- <sup>45</sup> Southeast Missouri Climate Protection Initiative. Purpose. [http://cstl.semo.edu/semocpi/Climate\\_Change\\_Information/purpose.htm](http://cstl.semo.edu/semocpi/Climate_Change_Information/purpose.htm)
- <sup>46</sup> RSMo 8.812: State Buildings and Lands, Minimum energy efficiency standards for state buildings. <http://www.moga.mo.gov/statutes/C000-099/0080000812.HTM>
- <sup>47</sup> BCAP webpage "Missouri", accessed April 26, 2011 from <http://bcap-ocean.org/state-country/missouri> and BCAP <http://bcap-ocean.org/code-information/missouri-minimum-energy-efficiency-standards-state-buildings>
- <sup>48</sup> Missouri Revised Statutes, Chapter 48, County Classification. Accessed May 17, 2011 from <http://www.moga.mo.gov/statutes/chapters/chap048.htm>
- <sup>49</sup> Missouri Association of Counties. Accessed May 12, 2001 from [http://www.mocounties.com/countyinfo/MAC\\_CountyClassification2011.pdf](http://www.mocounties.com/countyinfo/MAC_CountyClassification2011.pdf) and Missouri Revised Statutes, Chapter 67, Political Subdivisions, Miscellaneous Powers, Section 67.280. Accessed May 17, 2011 from <http://www.moga.mo.gov/statutes/C000-099/0670000280.HTM> And direct communication with Mary Ellen Brennan, Assistant Director for Missouri Association of Counties, to Maria Ellingson, May 17, 2011.
- <sup>50</sup> Maryellen Brennan, Assistant Director, Missouri Association of Counties. Direct communication to Maria Ellingson,
- <sup>51</sup> Richard Sheets, Deputy Director, Missouri Municipal League. Direct communication to Maria Ellingson, May 12, 2011.
- <sup>52</sup> ICC website. International Code Adoptions (Missouri). Accessed May 19, 2011 from <http://www.iccsafe.org/gr/Pages/adoptions.aspx> and direct communication with some jurisdictions.
- <sup>53</sup> *Impacts of the 2009 IECC for Residential Buildings*. Pacific Northwest National Laboratory. September 2009.
- <sup>54</sup> RS Means is a well-respected construction cost reference that includes square foot costs for thousands of building products, including those used in BCAP's analysis.
- <sup>55</sup> BCAP webpage "Missouri", accessed June 1, 2011 from <http://bcap-ocean.org/state-country/missouri>
- <sup>56</sup> SB 1181 (2008), Missouri General Assembly. [http://www.senate.mo.gov/08info/BTS\\_Web/Bill.aspx?SessionType=R&BillID=144166](http://www.senate.mo.gov/08info/BTS_Web/Bill.aspx?SessionType=R&BillID=144166)
- <sup>57</sup> RSMo 8.812: State Buildings and Lands, Minimum energy efficiency standards for state buildings. <http://www.moga.mo.gov/statutes/C000-099/0080000812.HTM>
- <sup>58</sup> BCAP webpage "Missouri", accessed April 26, 2011 from <http://bcap-ocean.org/state-country/missouri> and BCAP <http://bcap-ocean.org/code-information/missouri-minimum-energy-efficiency-standards-state-buildings>
- <sup>59</sup> Missouri Governor's Executive Order 09-18.
- <sup>60</sup> Ibid
- <sup>61</sup> DNR webpage American Recovery and Reinvestment Act, Energize Missouri Homes. Accessed May 18, 2011 from <http://www.dnr.mo.gov/transform/energizemissourihomes.htm#geothermal>
- <sup>62</sup> City of Columbia, Office of Sustainability. LEED Certifications. <http://www.gocolumbiamo.com/Sustainability/LEED/>
- <sup>63</sup> Energy Star webpage Builders in Missouri. Accessed May 19, 2011 from [http://www.energystar.gov/index.cfm?fuseaction=new\\_homes\\_partners.showAreaResults&s\\_code=MO&msa\\_id=all&show=ALL#filterHdr](http://www.energystar.gov/index.cfm?fuseaction=new_homes_partners.showAreaResults&s_code=MO&msa_id=all&show=ALL#filterHdr)



- 
- <sup>64</sup> For more information see these websites: Missouri Gas Energy: <http://www.betterheatingnow.com/> and KCP&L: [http://www.kcplsave.com/residential/programs\\_and\\_services/home\\_performance\\_with\\_energy\\_star/default.html](http://www.kcplsave.com/residential/programs_and_services/home_performance_with_energy_star/default.html)
- <sup>65</sup> For more information see: [http://gocolumbiamo.com/WaterandLight/Home\\_Performance/homeperformance.php](http://gocolumbiamo.com/WaterandLight/Home_Performance/homeperformance.php)
- <sup>66</sup> For more information see: <http://www.earthwayscenter.org/homeperformance/index.shtml>
- <sup>67</sup> To learn about the homes built to Building America standards in Illinois, go to [http://apps1.eere.energy.gov/buildings/building\\_america/cfm/state.cfm/state=in/full=Indiana](http://apps1.eere.energy.gov/buildings/building_america/cfm/state.cfm/state=in/full=Indiana).
- <sup>68</sup> Missouri Governor's Executive Order 09-18.
- <sup>69</sup> Kansas City. Sustainability, *Where We Are and Where We're Going* Accessed May 20, 2011 from <http://www.kcmo.org/idc/groups/citymanager/documents/citymanagersoffice/022788.pdf>
- <sup>70</sup> Kansas City's *Climate Protection Plan* can be found here: <http://www.kcmo.org/idc/groups/citymanager/documents/citymanagersoffice/022729.pdf>
- <sup>71</sup> City of Kansas City. Climate Protection Plan Steering Committee. *Climate Protection Plan*. July 2008. At 2. <http://www.kcmo.org/idc/groups/citymanager/documents/citymanagersoffice/022729.pdf>
- <sup>72</sup> Id at 19.
- <sup>73</sup> Kansas City. Sustainability, *Where We Are and Where We're Going* Accessed May 20, 2011 from <http://www.kcmo.org/idc/groups/citymanager/documents/citymanagersoffice/022788.pdf>
- <sup>74</sup> Sustainable Cities Institute, webpage Kansas City. Accessed May 20, 2011 from [http://www.sustainablecitiesinstitute.org/view/page.basic/city\\_profile/content.city\\_profile/City\\_Profile\\_KansasCity\\_MO](http://www.sustainablecitiesinstitute.org/view/page.basic/city_profile/content.city_profile/City_Profile_KansasCity_MO)
- <sup>75</sup> City of Columbia, Office of Sustainability. <http://www.gocolumbiamo.com/Sustainability/>
- <sup>76</sup> City of Columbia, Office of Sustainability. Sustain Columbia. [http://www.gocolumbiamo.com/Sustainability/documents/sustain\\_columbia.pdf](http://www.gocolumbiamo.com/Sustainability/documents/sustain_columbia.pdf)
- <sup>77</sup> See <http://www.energycodes.gov/arra/documents/MeasuringStateCompliance.pdf> for more information.
- <sup>78</sup> See <http://eeba.org/housesthatwork/index.html> for locations.